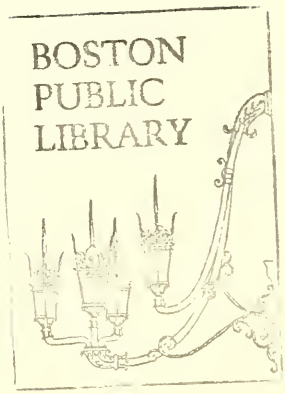
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PROJECT MANUAL FOR:

640 TREMONT STREET

BOSTON, MASSACHUSETTS

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X SEPTEMBER 1989

SEP 14 1989

PROJECT MANUAL FOR:

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SPECIFICATIONS FOR:

640 TREMONT STREET

BOSTON, MASSACHUSETTS

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SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

PROJECT DESCRIPTION

The Project consists of construction of 27 new housing units and 3 commercial units within the remaining shell of the structure located, at 640 Tremont Street, Boston, Massachusetts", for Inquilinos Boricuas en Accion, as shown on Contract Documents prepared by Comunitas, 75 Kneeland Street, Boston, Massachusetts, dated _____,1989.

The Work consists of the construction of 6 floors of housing units and a basement parking garage on the site. Restoration of the existing brick walls, new landscape development, utilities, paving and other site improvements are required as part of the Work.

The Work generally includes but is not limited to construction of a structural steel frame supporting precast concrete plank floors, steel stud supported exterior curtain walls with brick veneer or acrylic stucco finish, plywood roof deck on prefabricated wood trusses, asphalt shingle roofing, roof accessories, flashing & sheet metal, steel stud and gypsum board interior partitions, hollow metal, wood, and composition doors and frames, aluminum windows, hardware, glazing, interior finishes and furnishings including residential appliances, elevator, plumbing, fire protection, heating-ventilating-air conditioning, electrical systems, and lighting systems.

CONTRACTOR USE OF PREMISES

General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.

Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

Keep driveways and entrances serving the premises clear and available to the Owner and the Architect and their consultants at all times. Do not use these

areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

Maintenance of the Existing Structure: Maintain the existing structure throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the existing structure during the construction period.

PART 2 - PRODUCTS (Not applicable).

PART 3 - EXECUTION (Not applicable).

END OF SECTION 01010

SECTION 01020 - ALLOWANCES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements governing handling and processing allowances.

Selected materials and equipment, and in some cases, their installation are shown and specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by Change Order.

Types of allowances required include the following:

Unit-cost allowances.

Procedures for submitting and handling Change Orders are included in the General Conditions of the Contract for Construction (AIA Document A201 1976 edition).

SELECTION AND PURCHASE

At the earliest feasible date after Contract award, advise the Architect of the date when the final selection and purchase of each product or system described by an allowance must be completed in order to avoid delay in performance of the Work.

When requested by the Architect, obtain proposals for each allowance for use in making final selections; include recommendations that are relevant to performance of the Work.

Purchase products and systems as selected by the Architect from the designated supplier.

SUBMITTALS

Submit invoices or delivery slips to indicate actual quantities of materials delivered to the site for use in fulfillment of each allowance.

UNUSED MATERIALS

Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.

Where it is not economically feasible to return unused material for credit and when requested by the Architect, prepare unused material for the Owner's storage, and deliver to the Owner's storage space as directed. Otherwise, disposal of excess material is the Contractor's responsibility.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

INSPECTION

Inspect products covered by an allowance promptly upon delivery for damage or defects.

PREPARATION

Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related construction activities.

SCHEDULE OF ALLOWANCES

Allowance No. 2: Include a unit cost of $500.00 per thousand for purchase of brick to be selected by the Architect and as specified in "Unit Masonry" Section of Division-4, as indicated on the Drawings.

END OF SECTION 01020

SECTION 01027 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

SCHEDULE OF VALUES

Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

Contractor's construction schedule.
Application for Payment form.
List of subcontractors.
Schedule of allowances.
List of products.
List of principal suppliers and fabricators.
Schedule of submittals.

Submit the Schedule of Values to the Architect at the earliest feasible date, but in no case later than 14 days after execution of the Contract for Construction.

Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.

Identification: Include the following Project identification on the Schedule of Values:

Project name and location.
Name of the Architect.
Project number.

Contractor's name and address.
Date of submittal.

Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:

Generic name.
Related Specification Section.
Name of subcontractor.
Name of manufacturer or fabricator.
Name of supplier.
Change Orders (numbers) that have affected value.
Dollar value.
Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.

Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.

For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

Schedule Updating: Each Change Order or Construction Change Directive shall become a new line item in the Schedule of Values and on Applications for Payment.

APPLICATIONS FOR PAYMENT

Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.

Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment.

Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.

Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

Transmittal: Submit 3 executed copies of each Application for Payment to the Architect by means ensuring receipt within 24 hours. One copy shall be complete with all waivers of lien required.

Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.

Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.

When an application shows completion of an item, submit final or full waivers.

The Owner reserves the right to designate which entities involved in the Work must submit waivers.

Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.

Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of Work covered by the application who could lawfully be entitled to a lien.

Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.

Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

List of subcontractors.
List of principal suppliers and fabricators.
Schedule of Values.
Contractor's Construction Schedule (preliminary if not final).
Schedule of principal products.
Submittal Schedule (preliminary if not final).
List of Contractor's staff assignments.
List of Contractor's principal consultants.
Copies of authorizations and licenses from governing authorities for performance of the Work.
Initial progress report.
Report of pre-construction meeting.
Certificates of insurance and insurance policies.

Performance and payment bonds (if required).
Data needed to acquire Owner's insurance.

Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

Administrative actions and submittals that shall proceed or coincide with this application include:

Occupancy permits and similar approvals.
Warranties (guarantees) and maintenance agreements.
Test/adjust/balance records.
Maintenance instructions.
Meter readings.
Start-up performance reports.
Change-over information related to Owner's occupancy, use, operation and maintenance.
Final cleaning.
Application for reduction of retainage, and consent of surety.
Advice on shifting insurance coverages.

List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

Completion of Project closeout requirements.
Completion of items specified for completion after Substantial Completion.
Assurance that unsettled claims will be settled.
Assurance that Work not complete and accepted will be completed without undue delay.
Transmittal of required Project construction records to Owner.
Proof that taxes, fees and similar obligations have been paid.
Removal of temporary facilities and services.
Removal of surplus materials, rubbish and similar elements.
Change of door locks to Owner's access.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01027

SECTION 01040 - PROJECT COORDINATION

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:

Coordination.
Administrative and supervisory personnel.
General installation provisions.
Cleaning and protection.

Field engineering is included in Section "Field Engineering".

Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".

COORDINATION

Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.

Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

Make adequate provisions to accommodate items scheduled for later installation.

Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

Preparation of schedules.
Installation and removal of temporary facilities.
Delivery and processing of submittals.
Progress meetings.
Project Close-out activities.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

GENERAL INSTALLATION PROVISIONS

Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

Recheck measurements and dimensions, before starting each installation.

Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

CLEANING AND PROTECTION

During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

Excessive static or dynamic loading.
Excessive internal or external pressures.
Excessively high or low temperatures.
Water or ice.
Solvents.
Puncture.
Abrasion.
Soiling, staining and corrosion.
Combustion.
Electrical current.
Excessive weathering.
Unprotected storage.
Improper shipping or handling.
Theft.
Vandalism.

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements for cutting and patching.

Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

> Requirements of this Section apply to mechanical and electrical installations. Refer to Division-15 and Division-16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

Demolition of selected potions of the building for alterations is included in Section "Selective Demolition."

SUBMITTALS

Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

> Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
>
> Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
>
> List products to be used and firms or entities that will perform Work.
>
> Indicate dates when cutting and patching is to be performed.
>
> List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.

Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

QUALITY ASSURANCE

Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements except as noted on the drawings or specified in of section of these specifications:

Structural steel.
Lintels.
Structural decking.
Stair systems.
Miscellaneous structural metals.
Equipment supports.
Piping, ductwork, vessels and equipment.

Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

Shoring, bracing, and sheeting.
Primary operational systems and equipment.
Water, moisture, or vapor barriers.
Membranes and flashings.
Fire protection systems.
Electrical wiring systems.

Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the

original installer or fabricator, engage another recognized experienced and specialized firm:

Acoustical ceilings.
Finished wood flooring.
Fluid-applied flooring.
Carpeting.
Wall covering.
HVAC enclosures, cabinets or covers.

PART 2 - PRODUCTS

MATERIALS

Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

INSPECTION

Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PREPARATION

Temporary Support: Provide temporary support of Work to be cut.

Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

PERFORMANCE

General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.

By-pass utility services such as pipe or conduit of systems requiring continuous service, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

The Electrical Contractor shall permanently disconnect any and all wiring to be removed or abandoned. Coordinate with selective demolition work.

Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.

CLEANING

Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01090 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

DEFINITIONS

General: Basic Contract definitions are included in the General Conditions.

Indicated refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.

Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Architect", "requested by the "Architect", and similar phrases. However, no implied meaning shall be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

Approve: The term "approved," where used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the duties and responsibilities of the Architect as stated in General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.

Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

Furnish: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."

Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."

Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

Installer: An "Installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

> The term "experienced," when used with the term "Installer" means having a minimum of 5 previous Projects similar in size and scope to this Project, being familiar with the precautions required, and having complied with requirements of the authority having jurisdiction.

Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other construction activities as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land upon which the Project is to be built.

Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

SPECIFICATION FORMAT AND CONTENT EXPLANATION

Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTERFORMAT numbering system.

Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

> Abbreviated Language: Language used in the Specifications and other Contract Documents is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and where the full context of the Contract Documents so indicates.
>
> Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
>
> > The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

Assignment of Specialists: The Specification requires that certain specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

DRAWING SYMBOLS

Graphic symbols: Where not otherwise noted, symbols are defined by "Architectural Graphic Standards," published by John Wiley & Sons, Inc., eighth edition.

Mechanical/Electrical Drawings: Graphic symbols used on mechanical and electrical Drawings are generally aligned with symbols recommended by ASHRAE. Where appropriate, they are supplemented by more specific symbols recommended by technical associations including ASME, ASPE, IEEE, and similar organizations. Refer instances of uncertainty to the Architect for clarification before proceeding.

INDUSTRY STANDARDS

Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference. Individual Sections indicate which codes and standards the Contractor must keep available at the Project Site for reference.

Publication Dates: Where the date of issue of a referenced standard is not specified, comply with the standard in effect as of date of Contract Documents.

Updated Standards: At the request of the Architect, Contractor, or authority having jurisdiction, submit a Change Order proposal where an applicable code or standard has been revised and reissued after the date of the Contract Documents and before performance of Work affected. The Architect will decide whether to issue a Change Order to proceed with the updated standard.

Conflicting Requirements: Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect for a decision before proceeding.

> Minimum Quantity or Quality Levels: In every instance the quantity or quality level shown or specified shall be the minimum to be provided or performed. The actual installation may comply exactly, within specified tolerances, with the minimum quantity or quality specified, or it may exceed that minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for the context of the requirements. Refer instances of uncertainty to the Architect for a decision before proceeding.

Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.

> Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.

Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

GOVERNING REGULATIONS/AUTHORITIES

The Architect has contacted authorities having jurisdiction where necessary to obtain information necessary for the preparation of Contract Documents; that information may or may not be of significance to the Contractor. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

> Copies of Correspondence: During preparation of the Contract Documents, the Architect has maintained a file of correspondence with authorities having jurisdiction. This file is available at the Architect's office for reference. If requested, the Architect will provide copies of correspondence at cost of reproduction.

SUBMITTALS

Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices,

receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01090

SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements for project meetings including but not limited to:

Pre-Construction Conference.
Progress & Coordination Meetings.

PRE-CONSTRUCTION CONFERENCE

Schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

Attendees: The Owner, Architect, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

Agenda: Discuss items of significance that could affect progress including such topics as:

Tentative construction schedule.
Critical Work sequencing.
Designation of responsible personnel.
Procedures for processing field decisions and Change Orders.
Procedures for processing Applications for Payment.
Distribution of Contract Documents.
Submittal of Shop Drawings, Product Data and Samples.
Preparation of record documents.
Use of the premises.
Office, Work and storage areas.
Equipment deliveries and priorities.
Safety procedures.
First aid.
Security.

Housekeeping.
Working hours.

PROGRESS & COORDINATION MEETINGS

Conduct Project Progress & Coordination Meetings at regularly scheduled times convenient for all parties involved. Coordinate dates of meetings with preparation of the payment request.

Attendees: In addition to representatives of the Owner and Architect, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

Record: meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

Review the present and future needs of each entity present, including such items as:

Interface requirements.
Time.
Sequences.
Deliveries.
Off-site fabrication problems.
Access.
Site utilization.
Temporary facilities and services.
Hours of Work.
Hazards and risks.
Housekeeping.
Quality and Work standards.
Change Orders.
Documentation of information for payment requests.

Reporting: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

END OF SECTION 01200

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:

Submittal schedule.
Shop Drawings.
Product Data.
Samples.

Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

Permits.
Applications for payment.
Insurance certificates.
List of Subcontractors.

The Schedule of Values submittal is included in Section "Applications for Payment."

SUBMITTAL PROCEDURES

Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

Allow one weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

If an intermediate submittal is necessary, process the same as the initial submittal.

Allow one week for reprocessing each submittal.

No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

Include the following information on the label for processing and recording action taken.

Project name.
Date.
Name and address of Architect.
Name and address of Contractor.
Name and address of subcontractor.
Name and address of supplier.
Name of manufacturer.
Number and title of appropriate Specification Section.
Drawing number and detail references, as appropriate.

Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document

requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

SUBMITTAL SCHEDULE

Contractors shall prepare a complete schedule of submittals. Submit the schedule within 10 days of the execution of the Agreement.

Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

Prepare the schedule in chronological order. Provide the following information:

Scheduled date for the first submittal.
Related Section number.
Submittal category.
Name of subcontractor.
Description of the part of the Work covered.
Scheduled date for resubmittal.
Scheduled date the Architect's final release or approval.

Distribution: Following response to initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

SHOP DRAWINGS

Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

Dimensions.

Identification of products and materials included.
Compliance with specified standards.
Notation of coordination requirements.
Notation of dimensions established by field measurement.

Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 24" x 36".

Submittals: Submit one correctable translucent reproducible print and one blue- or black-line print for the Architect's review; the reproducible print will be returned.

Contractors shall provide a print of each approved submittal. Prints shall be marked-up and maintained as a "Record Document".

Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.

Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

PRODUCT DATA

Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

Manufacturer's printed recommendations.
Compliance with recognized trade association standards.
Compliance with recognized testing agency standards.
Application of testing agency labels and seals.

Notation of dimensions verified by field measurement.
Notation of coordination requirements.

Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Architect will retain one, and will return the other marked with action taken and corrections or modifications required.

Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.

Do not permit use of unmarked copies of Product Data in connection with construction.

SAMPLES

Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's Sample. Include the following:

Generic description of the Sample.
Sample source.
Product name or name of manufacturer.
Compliance with recognized standards.
Availability and delivery time.

Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.

Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

Preliminary submittals will be reviewed and returned with the Architect's mark indicating selection and other action.

Submittals: Submit 3 sets; one will be returned marked with the action taken.

Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

Sample sets may be used to obtain final acceptance of the construction associated with each set.

ARCHITECT'S ACTION

Except for submittals for record, information or similer purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.

Compliance with specified characteristics is the Contractor's responsibility.

Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

Final Unrestricted Release: Where submittals are marked "Approved," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

Final-But-Restricted Release: When submittals are marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

Returned for Resubmittal: When submittal is marked "Not Approved, Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or

prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

Do not permit submittals marked "Not Approved, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01300

SECTION 01400 - QUALITY CONTROL SERVICES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements for quality control services.

Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.

Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

> Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
>
> Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
>
> Requirements for the Contractor to provide quality control services required by the Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

RESPONSIBILITIES

Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor.

Costs for these services specifically indicated to be the Owner's responsibility, shall be borne by the Owner. All other costs shall be included in the Contract Sum.

The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibility.

Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.

Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.

Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:

Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.

Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.

Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.

Security and protection of samples and test equipment at the Project site.

Owner Responsibilities: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.

The Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility.

Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition to Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

SUBMITTALS

The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Architect, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.

Submit additional copies of each written report directly to the governing authority, when the authority so directs.

Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:

Date of issue.
Project title and number.
Name, address and telephone number of testing agency.
Dates and locations of samples and tests or inspections.
Names of individuals making the inspection or test.
Designation of the Work and test method.
Identification of product and Specification Section.
Complete inspection or test data.
Test results and an interpretation of test results.
Ambient conditions at the time of sample-taking and testing.
Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
Name and signature of laboratory inspector.
Recommendations on retesting.

QUALITY ASSURANCE

Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the

American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

REPAIR AND PROTECTION

General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

Protect construction exposed by or for quality control service activities, and protect repaired construction.

Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 01400

SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
Temporary utilities required include but are not limited to:

Water service and distribution.
Temporary electric power and light.
Telephone service.
Storm and sanitary sewer.

Temporary construction and support facilities required include but are not limited to:

Temporary heat.
Field offices and storage sheds.
Sanitary facilities, including drinking water.
Dewatering facilities and drains.
Temporary enclosures.
Hoists and temporary elevator use.
Temporary Project identification signs and bulletin boards.
Waste disposal services.
Rodent and pest control.
Construction aids and miscellaneous services and facilities.

Security and protection facilities required include but are not limited to:

Temporary fire protection.
Barricades, warning signs, lights.
Sidewalk bridge or enclosure fence for the site.
Environmental protection.

SUBMITTALS

Temporary Utilities: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

QUALITY ASSURANCE

Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

Building Code requirements.
Health and safety regulations.
Utility company regulations.
Police, Fire Department and Rescue Squad rules.
Environmental protection regulations.

Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library, "Temporary Electrical Facilities."

Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

PROJECT CONDITIONS

Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

MATERIALS

General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

Lumber and Plywood: Comply with requirements in Division-6 Section "Rough Carpentry."

For job-built temporary offices, shops and sheds within the construction area, provide UL labeled, fire treated lumber and plywood for framing, sheathing and siding.

For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.

For fences and vision barriers, provide exterior type, minimum 3/8" thick plywood.

For safety barriers, sidewalk bridges and similar uses, provide minimum 5/8" thick exterior plywood.

Paint: Comply with requirements of Division-9 Section "Finish Painting."

For job-built temporary offices, shops, sheds, fences and other exposed lumber and plywood, provide exterior grade acrylic-latex emulsion over exterior primer.

For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.

For interior walls of temporary offices, provide two coats interior latex flat wall paint.

Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

Water: Provide potable water approved by local health authorities.

Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1-1/2" I.D. for line posts and 2-1/2" I.D. for corner posts.

EQUIPMENT

General: Provide new equipment; if acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.

Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.

Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

First Aid Supplies: Comply with governing regulations.

Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

INSTALLATION

Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

TEMPORARY UTILITY INSTALLATION

General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.

Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a Change Order.

Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

Sterilization: Sterilize temporary water piping prior to use.

Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.

Except where overhead service must be used, install electric power service underground.

Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

Temporary Lighting: Wherever overhead floor or roof deck has been installed, provide temporary lighting with local switching.

Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.

At each telephone, post a list of important telephone numbers.

Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

Connect temporary sewers to the municipal system as directed by the sewer department officials.

Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access.

Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.

Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.

Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.

Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:

Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.

Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best service the Project's needs.

Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

Toilets: Use of the Owner's existing toilet facilities will be permitted, so long as facilities are cleaned and maintained in a condition acceptable to the Owner. At Substantial Completion, restore these facilities to the condition prevalent at the time of initial use.

Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

Drinking Water Facilities: Provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.

Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division-2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations and construction free of water.

Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.

Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.

Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.

Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

Temporary Elevator Use: Refer to Division-14 "Elevator" Sections.

Project Identification and Temporary Signs: Prepare project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.

Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

Temporary Exterior Lighting: Install exterior yard and sign lights so that signs are visible when Work is being performed.

Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

Rodent and Pest Control: Before deep foundation Work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be relatively free of pests and their residues at Substantial Completion. Perform control operations in a lawful manner using environmentally safe materials.

Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

SECURITY AND PROTECTION FACILITIES INSTALLATION

Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.

Store combustible materials in containers in fire-safe locations.

Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

Enclosure Fence: When excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except by the entrance gates.

Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.

Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.

Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

OPERATION, TERMINATION AND REMOVAL

Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.

Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

Termination and Removal: Unless the Architect requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt or other petrochemical compounds, and other substances which might impair growth of

plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.

At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

Replace air filters and clean inside of ductwork and housings.

Replace significantly worn parts and parts that have been subject to unusual operating conditions.

Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01500

SECTION 01600 - MATERIALS AND EQUIPMENT

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals."

Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.

Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

DEFINITIONS

Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.

"Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

"Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

"Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

"Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

SUBMITTALS

Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Architect. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.

Coordinate the product list schedule with the Contractor's Construction Schedule and the Schedule of Submittals.

Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.

Completed Schedule: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

Architect's Action: The Architect will respond in writing to the Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Architect's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

QUALITY ASSURANCE

Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.

Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.

Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

Name of product and manufacturer.
Model and serial number.
Capacity.
Speed.
Ratings.

PRODUCT DELIVERY, STORAGE, AND HANDLING

Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.

Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.

Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.

Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.

Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

PRODUCT SELECTION

General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.

Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:

Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.

Semiproprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.

Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.

Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.

Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.

Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern and texture from the product line selected.

Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division-1 for allowances that control product selection, and for procedures required for processing such selections.

PART 3 - EXECUTION

INSTALLATION OF PRODUCTS

Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

SECTION 01631 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals."

Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.

Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment."

DEFINITIONS

Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:

Revisions to Contract Documents requested by the Owner or Architect.

Specified options of products and construction methods included in Contract Documents.

The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

SUBMITTALS

Substitution Request Submittal: Requests for substitution will be considered if received within 60 days after commencement of the Work. Requests received more than 60 days

after commencement of the Work may be considered or rejected at the discretion of the Architect.

Submit 3 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.

Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

Product Data, including Drawings and descriptions of products, fabrication and installation procedures.

Samples, where applicable or requested.

A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.

Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.

A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

Cost information, including a proposal of the net change, if any in the Contract Sum.

Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.

Architect's Action: Within one week of receipt of the request for substitution, the Architect will request additional information or documentation necessary for evaluation of the request. Within 2 weeks of receipt of the request, or one week of receipt of the additional information or documentation, which ever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be

made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

SUBSTITUTIONS

Conditions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.

Extensive revisions to Contract Documents are not required.

Proposed changes are in keeping with the general intent of Contract Documents.

The request is timely, fully documented and properly submitted.

The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.

The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.

The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.

The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01631

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

SUMMARY

This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

Inspection procedures.
Project record document submittal.
Operating and maintenance manual submittal.
Submittal of warranties.
Final cleaning.

Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

SUBSTANTIAL COMPLETION

Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

Deliver tools, spare parts, extra stock, and similar items.

Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.

Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

The Architect will repeat inspection when requested and assured that the Work has been substantially completed.

Results of the completed inspection will form the basis of requirements for final acceptance.

FINAL ACCEPTANCE

Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

Submit an updated final statement, accounting for final additional changes to the Contract Sum.

Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.

Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been

completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.

Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advice the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

If necessary, reinspection will be repeated.

RECORD DOCUMENT SUBMITTALS

General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.

Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

Note related Change Order numbers where applicable.

Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Architect for the Owner's records.

Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

Emergency instructions.
Spare parts list.
Copies of warranties.
Wiring diagrams.
Recommended "turn around" cycles.
Inspection procedures.
Shop Drawings and Product Data.
Fixture lamping schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

CLOSEOUT PROCEDURES

Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

Maintenance manuals.
Record documents.
Spare parts and materials.
Tools.
Lubricants.
Fuels.
Identification systems.
Control sequences.
Hazards.
Cleaning.
Warranties and bonds.
Maintenance agreements and similar continuing commitments.

As part of instruction for operating equipment, demonstrate the following procedures:

Start-up.
Shut down.
Emergency operations.
Noise and vibration adjustments.
Safety procedures.
Economy and efficiency adjustments.
Effective energy utilization.

FINAL CLEANING

General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".

Cleaning: The Contractor shall be responsible for final cleaning in accordance with the following provisions:

Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

Remove labels that are not permanent labels.

Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other demeged transparent materials.

Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

Clean the site, including landscape development areas, of rubbish, litter and foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

Removal of Protection: Each subcontractor shall be responsible for removal temporary protection and facilities installed by them for protection of the Work during construction.

Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01700

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of selective demolition work is indicated on drawings.

Types of Selective Demolition Work: Demolition requires the selective removal and subsequent offsite disposal of the following:

Portions of building structure indicated on drawings and as required to accommodate new construction.

Removal of portions of the existing brick and stone walls as indicated on drawings. Brick shall be retained as necessary to carry out restoration work as described in "Masonry Restoration" section in Division Four. Brick remaining after completion of restoration work shall be disposed of offsite.

Related work specified elsewhere:

Remodeling construction work and patching is included within the respective sections of specifications, including removal of materials for re-use and incorporated into remodeling or new construction.

SUBMITTALS

Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's Representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

JOB CONDITIONS

Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

Storage or sale of removed items on site will not be permitted.

Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.

Remove protections at completion of work.

Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

Explosives: Use of explosives will not be permitted.

Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

Environmental Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

INSPECTION

Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.

PREPARATION

Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

Locate, identify, stub off and disconnect utility services that are not indicated to remain.

DEMOLITION

Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power- driven impact tools.

Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.

Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

Demolish foundation walls to a depth of not less than 12" below existing ground surface. Demolish and remove below-grade wood or metal construction. Break up below-grade concrete slabs.

For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.

Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel or sand, free of trash and debris, stones over 6" diameter, roots or other organic matter.

If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative rearrange selective demolition schedule as necessary to continue overall job progress without delay.

DISPOSAL OF DEMOLISHED MATERIALS

Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.

If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

Burning of removed materials is not permitted on project site.

CLEAN-UP AND REPAIR

Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02070

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Preparing of subgrade for building slabs, walks, ramps, and pavements.

Drainage fill course for support of building slabs is included as part of this work.

Excavating and backfilling of trenches within building lines.

Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.

Excavating and Backfilling for Mechanical/Electrical Work: Refer to Divisions 15 and 16 sections for excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.

Final Grading, together with placement and preparation of topsoil for lawns and planting, is specified in Division 2 Section, "Landscape Work."

DEFINITIONS

Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be at Contractor's expense.

Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill

may be used to bring elevations to proper position, when acceptable to Architect.

In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect.

Additional Excavation: When excavation has reached required subgrade elevations, notify Architect, who will make an inspection of conditions. If Architect determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Architect. The Contract Sum may be adjusted by an appropriate Contract Modification.

Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.

Subgrade: The undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.

Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

SUBMITTALS

Test Reports: Soil testing services shall be provided by the Owner. The Owner's testing agency shall submit the following reports directly to Architect, with copy to Contractor:

Test reports on borrow material.

Verification of suitability of each footing subgrade material, in accordance with specified requirements.

Field reports; in-place soil density tests.

One optimum moisture-maximum density curve for each type of soil encountered.

Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

QUALITY ASSURANCE

Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

Testing and Inspection Service: Owner will employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations.

Testing Laboratory Qualifications: To qualify for acceptance, the geotechnical testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geo-technical testing without delaying the progress of the Work.

PROJECT CONDITIONS

Site Information: Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.

Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

Use of Explosives: Use of explosives is not permitted.

Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

Operate warning lights as recommended by authorities having jurisdiction.

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

Perform excavation by hand within drip line of large trees to remain. Protect root systems from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.

PART 2 - PRODUCTS

SOIL MATERIALS

Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP.

Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.

Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.

Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

PART 3 - EXECUTION

EXCAVATION

Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

STABILITY OF EXCAVATIONS

General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring

and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

Provide permanent steel sheet piling or pressure-creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

DEWATERING

Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

STORAGE OF EXCAVATED MATERIALS

Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.

Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

EXCAVATION FOR STRUCTURES

Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

Excavation for Underground Tanks, Basins, and Mechanical or Electrical Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavations, intended for bearing surface.

EXCAVATION FOR PAVEMENTS

Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

TRENCH EXCAVATION FOR PIPES AND CONDUIT

Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.

For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensure continuous bearing of pipe barrel on bearing surface.

COLD WEATHER PROTECTION

Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

BACKFILL AND FILL

General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

Under grassed areas, use satisfactory excavated or borrow material.

Under walks and pavements, use subbase material, satisfactory excavated or borrow material, or a combination.

Under steps, use subbase material.

Under building slabs, use drainage fill material.

Under piping and conduit and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.

Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.

Concrete is specified in Division 3.

Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Architect. Use care in backfilling to avoid damage or displacement of pipe systems.

Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing of piping or conduit, provide minimum 4-inch-thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.

Backfill excavations as promptly as work permits, but not until completion of the following:

Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.

Removal of concrete formwork.

Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

Removal of trash and debris from excavation.

Permanent or temporary horizontal bracing is in place on horizontally supported walls.

PLACEMENT AND COMPACTION

Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Architect if soil density tests indicate inadequate compaction.

Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:

Under structures, building slabs and steps, and pavements, compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

Under lawn or unpaved areas, compact top 6 inches of subgrade and each layer of backfill or fill material at 90 percent maximum density.

Under walkways, compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or

layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

GRADING

General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.

Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.

Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.

Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.

Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

PAVEMENT SUBBASE COURSE

General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.

Refer to other Division 2 sections for paving specifications.

Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

When a compacted subbase course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

FIELD QUALITY CONTROL

Quality Control Testing During Construction: Allow Owner's testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

Owner's testing service shall perform field density tests in accordance with ASTM D1556 (sand cone method) or ASTM D2167 (rubber balloon method), as applicable.

Field density tests may also be performed by the nuclear method in accordance with ASTM D2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.

If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.

Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Architect.

Paved Areas and Building Slab Subgrade: Perform at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer that three tests. In each compacted fill layer, perform one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case fewer than three tests.

Foundation Wall Backfill: Perform at least two field density tests at locations and elevations as directed.

If in opinion of Architect, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

EROSION CONTROL

Provide erosion control methods in accordance with requirements of authorities having jurisdiction.

MAINTENANCE

Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

DISPOSAL OF EXCESS AND WASTE MATERIALS

Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off Owner's property.

END OF SECTION 02200

SECTION 02900 - LANDSCAPE WORK

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes provisions for the following items:

Trees.
Shrubs.
Plants.
Lawns.
Soil amendments.
Initial maintenance of landscape materials.

Related Sections: The following sections contain requirements that relate to this Section.

Excavation, filling, and rough grading required to establish elevations shown on drawings is specified in Division 2 Section, "Earthwork."

QUALITY ASSURANCE

Subcontract landscape work to a single firm specializing in landscape work.

Source Quality Control:

General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Architect, together with proposal for use of equivalent material.

Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

Trees, Shrubs, and Plants: Provide trees, shrubs, and plants of quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock". Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions, or disfigurement.

Label each tree and shrub with securely attached waterproof tag bearing legible designation of botanical and common name.

Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.

Inspection: The Architect may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, and quality. Architect retains right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Plant and Material Certifications:

Certificates of inspection as required by governmental authorities.

Manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials.

Label data substantiating that plants, trees, shrubs and planting materials comply with specified requirements.

Seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentages by weight, and percentages of purity, germination, and weed seed for each grass seed species.

Maintenance Instructions: Typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).

DELIVERY, STORAGE AND HANDLING

Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by Architect. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.

Do not remove container-grown stock from containers until planting time.

JOB CONDITIONS

Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

SEQUENCING AND SCHEDULING

Planting Time: Proceed with, and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

Plant or install materials during normal planting seasons for each type of plant material required.

Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

Coordination with Lawns: Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to Architect. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

SPECIAL PROJECT WARRANTY

Warranty lawns through specified lawn maintenance period, and until final acceptance.

Warranty trees and shrubs through specified maintenance period, and until final acceptance.

Warranty trees and shrubs, for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.

Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of Architect, it is advisable to extend warranty period for a full growing season.

Another warranty inspection will be conducted at end of extended warranty period, if any, to determine acceptance or rejection. Only one replacement (per tree, shrub or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

PART 2 - PRODUCTS

TOPSOIL

Topsoil has been (or will be) stockpiled for re-use in landscape work. If quantity of stockpiled topsoil is insufficient, provide additional topsoil as required to complete landscape work.

Provide new topsoil that is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2 inches in any dimension, and other extraneous or toxic matter harmful to plant growth.

Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4 inches. Do not obtain from bogs or marshes.

SOIL AMENDMENTS

Lime: Natural dolomitic limestone containing not less then 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not

less than 90 percent passes a 10-mesh sieve and not less than 50 percent passes a 100-mesh sieve.

Aluminum Sulfate: Commercial grade.

Peat Humus: Finely divided peat, so completely decomposed and free of fibers that its biological identity is lost. Provide in granular form, free of hard lumps and with pH range suitable for intended use.

Bonemeal: Commercial, raw, finely ground; 4 percent nitrogen and 20 percent phosphoric acid.

Superphosphate: Soluble mixture of treated minerals; 20 percent available phosphoric acid.

Sand: Clean, washed sand, free of toxic materials.

Perlite: Conforming to National Bureau of Standards PS 23.

Vermiculite: Horticultural grade, free of toxic substances.

Sawdust: Rotted sawdust, free of chips, stones, sticks, soil, or toxic substances and with 7.5 pounds of nitrogen uniformly mixed into each cubic yard of sawdust.

Manure: Well rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials and containing no chemicals or ingredients harmful to plants.

Mulch: Organic mulch free from deleterious materials and suitable for top dressing of trees, shrubs, or plants and consisting of one of the following:

Shredded hardwood
Ground or shredded bark
Wood chips
Pine needles

Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available plant nutrients:

For trees and shrubs, provide fertilizer with not less than 5 percent total nitrogen, 10 percent available phosphoric acid and 5 percent soluble potash.

For lawns, provide fertilizer with percentage of nitrogen required to provide not less than 1 pound of actual nitrogen per 1,000 sq. ft. of lawn area and not less than 4 percent phosphoric acid and 2 percent potassium. Provide nitrogen

in a form that will be available to lawn during initial period of growth; at least 50 percent of nitrogen to be organic form.

PLANT MATERIALS

Quality: Provide trees, shrubs, and other plants of size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock."

Deciduous Trees: Provide trees of height and caliper scheduled or shown and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are shown or listed.

Provide balled and burlapped (B&B) deciduous trees.

Container grown deciduous trees will be acceptable in lieu of balled and burlapped deciduous trees subject to specified limitations of ANSI Z60.1 for container stock.

Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required.

Provide balled and burlapped (B&B) deciduous shrubs.

Container grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs subject to specified limitations for container grown stock.

Coniferous and Broadleafed Evergreens: Provide evergreens of sizes shown or listed. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for other types, such as globe, dwarf, cone, pyramidal, broad upright, and columnar. Provide normal quality evergreens with well balanced form complying with requirements for other size relationships to the primary dimension shown.

Provide balled and burlapped (B&B) evergreens.

Container grown evergreens will be acceptable, subject to specified limitations for container grown stock.

GRASS MATERIALS

Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

"Schedule of Grass Seed Requirements" is attached at end of this section.

MISCELLANEOUS LANDSCAPE MATERIALS

Gravel: Water-worn, hard, durable gravel, washed free of loam, sand, clay, and other foreign substances, and of following size, range and color:

Size Range: 3/8 inches maximum, 1/8 inch minimum (pea gravel).

Color: Readily-available natural gravel color range.

Anti-Erosion Mulch: Provide clean, seed-free salt hay or threshed straw of wheat, rye, oats, or barley.

Anti-Desiccant: Emulsion type, film-forming agent designed to permit transpiration, but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.

Filtration/Separation Fabric: Water permeable filtration fabric of fiberglass or polypropylene fabric.

Wrapping: Tree-wrap tape not less than 4 inches wide, designed to prevent borer damage and winter freezing.

Stakes and Guys: Provide stakes and deadmen of sound new hardwood, treated softwood, or redwood, free of knot holes and other defects. Provide wire ties and guys of 2-strand, twisted, pliable galvanized iron wire, not lighter than 12 ga. with zinc-coated turnbuckles. Provide not less than 1/2 inch diameter rubber or plastic hose, cut to required lengths and of uniform color, material, and size to protect tree trunks from damage by wires.

PART 3 - EXECUTION

PREPARATION - GENERAL

Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Architect's acceptance before start of planting work. Make minor adjustments as may be required.

PREPARATION OF PLANTING SOIL

Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.

Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.

"Schedule of Planting Soil Mixture Requirements" is shown on the drawings.

For planting beds and lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

Mix lime with dry soil prior to mixing of fertilizer.

Prevent lime from contacting roots of acid-loving plants.

Apply phosphoric acid fertilizer (other than that constituting a portion of complete fertilizers) directly to subgrade before applying planting soil and tilling.

PREPARATION FOR PLANTING LAWNS

Loosen subgrade of lawn areas to a minimum depth of 4 inches. Remove stones measuring over 1-1/2 inches in any dimension. Remove sticks, roots, rubbish, and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.

Spread top soil to minimum depth required to meet lines, grades, and elevations shown, after light rolling and natural settlement. Add specified soil amendments and mix thoroughly into upper 4 inches of topsoil.

Place approximately 1/2 of total amount of top soil required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil. Add specified soil amendments and mix thoroughly into upper 4 inches of topsoil.

Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn planting as follows: Till to a depth of not less than 6 inches. Apply soil amendments and initial fertilizers as specified. Remove high areas and fill in depressions. Till soil to a homogeneous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of Owner's property. Do not turn existing vegetation over into soil being prepared for lawns.

Apply specified commercial fertilizer at rates specified and thoroughly mix into upper 2 inches of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.

"Schedule of Planting Soil Mixture Requirements" indicating required rate of fertilizer application, is shown on the drawings.

Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

Restore lawn areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

PREPARATION OF PLANTING BEDS

Loosen subgrade of planting bed areas to a minimum depth of 6 inches using a culti-mulcher or similar equipment. Remove stones measuring over 1-1/2 inches in any dimension. Remove sticks, stones, rubbish, and other extraneous matter.

Spread planting soil mixture to minimum depth required to meet lines, grades, and elevations shown, after light rolling and natural settlement. Place approximately 1/2 of total amount of planting soil required. Work into top of loosened subgrade to create a transition layer, then place remainder of the planting soil.

Remove 8 inches to 10 inches of soil and replace with prepared planting soil mixture.

EXCAVATION FOR TREES AND SHRUBS

Excavate pits, beds, and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.

For bare root trees and shrubs, make excavations at least 12 inches wider than root spread and deep enough to allow for setting of roots on a layer of compacted backfill and with collar set at same grade level as in nursery, but 1 inch below finished grade at site.

Allow for 9 inch setting layer of planting soil mixture.

For balled and burlapped (B&B trees and shrubs), make excavations at least half again as wide as the ball diameter and equal to the ball depth, plus following allowance for setting of ball on a layer of compacted backfill:

Allow for 3 inch thick setting layer of planting soil mixture.

For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.

Dispose of subsoil removed from planting excavations. Do not mix with planting soil or use as backfill.

Fill excavations for trees and shrubs with water and allow water to percolate out prior to planting.

PLANTING TREES AND SHRUBS

Set balled and burlapped (B&B) stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. Remove burlap from sides of balls; retain on bottoms. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.

Set bare root stock on cushion of planting soil mixture. Spread roots and carefully work backfill around roots by hand and puddle with water until backfill layers are completely saturated. Plumb before backfilling and maintain plumb while working backfill around roots and placing layers of soil mixture above roots. Set collar 1 inch below adjacent finish landscape grades. Spread out roots without tangling or turning up to surface. Cut injured roots clean; do not break.

Set container grown stock, as specified, for balled burlapped stock, except cut cans on 2 sides with an approved can cutter; remove bottoms of wooden boxes after partial backfilling so as not to damage root balls.

Dish top of backfill to allow for mulching.

Mulch pits, trenches, and planted areas. Provide not less than following thickness of mulch, and work into top of backfill and finish level with adjacent finish grades.

Provide 2 inches thickness of mulch.

Apply anti-desiccant, using power spray, to provide an adequate film over trunks, branches, stems, twigs and foliage.

If deciduous trees or shrubs are moved when in full leaf, spray with anti-desiccant at nursery before moving and spray again 2 weeks after planting.

Prune, thin out, and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by Architect, do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any. Prune shrubs to retain natural character.

Remove and replace excessively pruned or misformed stock resulting from improper pruning.

Wrap tree trunks of 2 inches caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.

Guy and stake trees immediately after planting, as indicated.

SEEDING NEW LAWNS

Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

Sow seed using a spreader or seeding machine. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.

Sow not less than the quantity of seed specified or scheduled.

Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with a fine spray.

Protect seeded slopes against erosion with erosion netting or other methods acceptable to the Architect.

HYDROSEEDING NEW LAWNS

Mix specified seed, fertilizer, and pulverized mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

Apply slurry uniformly to all areas to be seeded. Rate of application as required to obtain specified seed sowing rate.

MISCELLANEOUS LANDSCAPE WORK

Place gravel beds where indicated. Compact soil subgrades before placing gravel.

Lay 8-mil polyethylene plastic film continuously over compacted subgrade prior to placing gravel. Overlap edges 4 inches at joints between sheets.

MAINTENANCE

Begin maintenance immediately after planting.

Maintain trees, shrubs, and other plants until final acceptance, but in no case, less than following period:

60 days after substantial completion of planting.

Maintain trees, shrubs, and other plants by pruning, cultivating, and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.

Seeded lawns, not less than 60 days after substantial completion.

Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

CLEANUP AND PROTECTION

During landscape work, keep pavements clean and work area in an orderly condition.

Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

INSPECTION AND ACCEPTANCE

When landscape work is completed, including maintenance, Architect will, upon request, make an inspection to determine acceptability.

When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Architect and found to be acceptable. Remove rejected plants and materials promptly from project site.

SCHEDULE OF GRASS SEED MIXTURES

Proportion By Weight	Common Name	Botanical Name	Min. % Germ.	Min. % Pure Sd.	Max % Weed Sd.
50%	Kentucky Bluegrass	Poa pratensis	80	85	0.50
30%	Chewings Red Fescue	Festuca rubra var.	85	98	0.50
10%	Perennial Ryegrass	Lolium Perenne	90	98	0.50
10%	Redtop	Agrostis alba	85	92	1.00

Sow mixture at 4 lbs. per 1000 square feet.

END OF SECTION 02900

SECTION 03310 - CONCRETE WORK

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of concrete work shown on drawings.

Concrete paving and walks are specified in Division 2.

Precast concrete is specified in other Division-3 sections.

Mechanical finishes and concrete floor toppings are specified in other Division-3 sections.

SUBMITTALS

Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.

Shop Drawings; Reinforcement: Submit original shop drawings prepared by registered Professional Engineer for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

Samples: Submit samples of materials as requested by Architect, including names, sources and descriptions.

Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

QUALITY ASSURANCE

Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

ACI 301 "Specifications for Structural Concrete for Buildings".

ACI 318 "Building Code Requirements for Reinforced Concrete."

Concrete Reinforcing Steel Institute, (CRSI) "Manual of Standard Practice".

PROJECT CONDITIONS:

Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

Protect adjacent finish materials against spatter during concrete placement.

PART 2 - PRODUCTS

FORM MATERIALS

Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

Forms Ties: Factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units which will leave no metal closer than 1-1/2" to surface.

Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.

REINFORCING MATERIALS

Reinforcing Bars: ASTM A 615, Grade 60, deformed.

Steel Wire: ASTM A 82, plain, cold-drawn steel.

Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.

For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

CONCRETE MATERIALS

Portland Cement: ASTM C 150, Type I.

Use one brand of cement throughout project, unless otherwise acceptable to Architect.

Fly-Ash: ASTM C 618, Type C or Type F.

Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to Architect.

Lightweight Aggregates: ASTM C 330.

Water: Drinkable.

Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Air-Mix": Euclid Chemical Co.
"Sika Aer"; Sika Corp.
"MB-VR or MB-AE"; Master Builders.
"Darex AEA" or "Daravair"; W.R. Grace.
"Edoco 2001 or 2002"; Edoco Technical Products.
"Air-Tite"; Gifford-Hill/American Admixtures.

Water-Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.1 percent chloride ions.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"WRDA Hycol"; W.R. Grace.
"PSI N"; Gifford-Hill/American Admixtures
"Eucon WR-75"; Euclid Chemical Co.
"Pozzolith Normal"; Master Builders.
"Plastocrete 160;" Sika Chemical Corp.
"Chemtard"; Chem-Masters Corp.
"Pro-Kete-N"; Protex Industries, Inc.

High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G and containing not more than 0.1 percent chloride ions.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"WRDA 19" or "Duracem"; W.R. Grace.
"PSP"; Protex Industries Inc.
"Super P"; Anti-Hydro.
"Sikament"; Sika Chemical Corp.
"Mighty 150"; ICI Americas Corp.
"Eucon 37"; Euclid Chemical Co.
"PSI Super"; Gifford-Hill.
"Rheobuild"; Master Builders.

Water Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.1 percent chloride ions.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Accelguard 80"; Euclid Chemical Co.
"Pozzolith High Early"; Master Builders.
"Gilco Accelerator"; Gifford-Hill/American Admixtures

Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and contain not more than 0.1 percent chloride ions.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Edoco 20006"; Edoco Technical Products.
"Pozzolith Retarder"; Master Builders.

"Eucon Retarder 75"; Euclid Chemical Co.
"Daratard"; W.R. Grace.
"PSI R"; Gifford-Hill/American Admixtures.
"Plastiment"; Sika Chemical Co.
"Protard"; Protex Industries, Inc.

Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.1 percent chloride ions are not permitted.

RELATED MATERIALS

Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.

Vapor Retarder: Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:

Polyethylene sheet not less than 4 mils thick.

Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Metallic

"Vibrofoil"; A.C. Horn, Inc.
"Metallic Spec. Grout"; The Burke Co.
"Embeco 636"; Master Builders.
"Ferrolith GDS"; Sonneborn-Rexnord.
"Hi-Mod Grout"; Euclid Chemical Co.
"Kemox G"; Sika Chemical Co.
"Ferrogrout"; L & M Const. Chemical Co.
"Supreme Plus"; Gifford-Hill/American Admixtures.

Non-metallic

"Set Grout"; Master Builders.
"Sonogrout"; Sonneborn-Rexnord.
"Euco-NS"; Euclid Chemical Co.
"Supreme"; Gifford-Hill/American Admixtures.
"Crystex" L & M Cons. Chemical Co.
"Sure-Grip Grout", Dayton Superior Corp.
"Horngrout"; A.C. Horn, Inc.
"Five Star Grout"; U.S. Grout Corp.

Chemical Hardener: Colorless aqueous solution containing a blend of magnesium flousilicate and zinc flousilicate combined with a wetting agent, containing not less than 2 lbs. of flousilicates per gal.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Surfhard"; Euclid Chemical Co.
"Lapidolith"; Sonneborne-Rexnord.
"Saniseal"; Master Builders.
"Burk-O-Lith"; The Burke Co.

Non-slip Aggregate Finish: Provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for non-slip finish with emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rust-proof and non-glazing, and is unaffected by freezing, moisture, and cleaning materials.

Colored Wear-Resistant Finish: Packaged, dry, combination of materials, consisting of portland cement, graded quartz aggregate, coloring pigments and plasticizing admixture. Use coloring pigments that are finely ground, non-fading mineral oxides, interground with cement. Color as selected by Architect, unless otherwise indicated.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Colorcron"; Master Builders.
"Harcol Redi-Mixed"; Sonneborn-Contech.
"Surflex"; Euclid Chemical Co.
"Colorundum"; A.C. Horn, Inc.
"Quartz Plate"; L & M Const. Chemical Co.
"Lithochrome"; L.M. Scofield Co.
"Floorcron"; Gifford-Hill/American Admixtures.

Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

Polyethylene film.

Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Masterseal"; Master Builders.
"A-H 3 Way Sealer"; Anti-Hydro Waterproofing Co.
"Ecocure"; Euclid Chemical Co.
"Clear Seal"; A.C. Horn, Inc.
"Sealco 309"; Gifford-Hill/American Admixtures.
"J-20 Acrylic Cure"; Dayton Superior.
"Spartan-Cote"; The Burke Co.
"Sealkure"; Toch Div. - Carboline.
"Kure-N-Seal"; Sonneborn-Rexnord.
"Polyclear"; Upco Chemical/USM Corp.
"L&M Cure"; L & M Construction Chemicals.
"Klearseal"; Setcon Industries.
"LR-152"; Protex Industries.
"Hardtop"; Gifford-Hill.

Bonding Compound: Polyvinyl acetate or acrylic base.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, to the following:

Polyvinyl Acetate (Interior Only):

"Euco Weld"; Euclid Chemical Co.
"Weldcrete"; Larsen Products Corp.

Acrylic or Styrene Butadiene:

"J-40 Bonding Agent"; Dayton Superior Corp.
"Everbond"; L & M Construction Chemicals.
"Hornweld"; A.C. Horn, Inc.
"Sonocrete"; Sonneborn-Rexnord.
"Acrylic Bondcrete"; The Burke Co.
"SBR Latex"; Euclid Chemical Co.
"Daraweld C"; W.R. Grace

Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, to the following:

"Thiopoxy"; W.R. Grace.
"Epoxtite"; A.C. Horn, Inc.

"Edoco 2118 Epoxy Adhesive"; Edoco Technical Prod.
"Sikadur Hi-Mod"; Sika Chemical Corp.
"Euco Epoxy 452 or 620"; Euclid Chemical Co.
"Patch and Bond Epoxy"; The Burke Co.
"Concresive 1001"; Adhesive Engineering Co.

PROPORTIONING AND DESIGN OF MIXES

Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

Limit use of fly ash to not exceed 25 percent of cement content by weight.

Submit written reports to Architect and Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been revieved by Architect.

Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

4000 psi 28-day compressive strength; W/C ratio, 0.44 maximum (non-air-entrained), 0.35 maximum (air-entrained).

3000 psi 28-day compressive strength; W/C ratio, 0.58 maximum (non-air-entrained), 0.46 maximum (air-entrained).

2500 psi 28-day compressive strength; W/C ratio, 0.67 maximum (non-air-entrained), 0.54 maximum (air-entrained).

Lightweight Concrete: Proportion mix as herein specified. Design mix to produce strength and modulus of elasticity as noted on drawings, with a split-cylinder strength factor (Fct) of not less than 5.5 for 3000 psi concrete and a dry weight of not less than 95 lbs. or more than 110 lbs. after 28 days. Limit shrinkage to 0.03 percent at 28 days.

Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

Admixtures:

Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.

Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).

Use high-range water-reducing admixture in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus-or-minus 1-1/2 percent within following limits:

Concrete structures and slabs exposed to freezing and thawing deicer chemicals, or subjected to hydraulic pressure:

4.5 percent (moderate exposure); 5.5 percent (severe exposure) 1-1/2" max. aggregate 4.5 percent (moderate exposure); 6.0 percent (severe exposure) 1" max. aggregate.

Other Concrete: (not exposed to freezing, thawing, or hydraulic pressure): 2 percent to 4 percent air.

Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.

Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:

Subjected to freezing and thawing; W/C 0.50.

Subjected to deicers/watertight; W/C 0.45.

Subjected to brackish water, salt spray or deicers; W/C 0.40.

Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

Ramps slabs, and sloping surfaces: Not more than 3".

Reinforced foundation systems: Not less than 1" and not more than 3".

Concrete containing HRWR admixture (super plasticizer): Not more than 8" after addition of HRWR to verified 2"-3" slump concrete.

Other Concrete: Not less than 1" nor more than 4".

CONCRETE MIXING

Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

PART 3 - EXECUTION

GENERAL

Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

FORMS

Design, erect, support, brace and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Maintain formwork construction tolerances complying with ACI 347.

Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms to sizes shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retightening forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

VAPOR RETARDER INSTALLATION

Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.

Lap joints 6" and seal with appropriate tape.

After placement of moisture barrier, cover with granular material and compact to depth as shown on drawings.

PLACING REINFORCEMENT

Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

Avoid cutting or puncturing vapor retarder during reinforcement placement and concreting operations.

Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

JOINTS

Construction Joints: Locate and install construction joints as indicated, or if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.

Provide keyways at least 1-1/2" deep in construction joints in walls, slabs and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.

Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.

Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.

> Joint filler and sealant materials are specified in Division-7 sections of these specifications.

Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8" x 1/4 slab depth or inserts 1/4" wide x 1/4 of slab depth, unless otherwise indicated.

Form contraction joints by inserting premolded plastic, hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

> Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

If joint pattern not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).

> Joint sealant material is specified in Division-7 sections of these specifications.

INSTALLATION OF EMBEDDED ITEMS

General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.

Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

PREPARATION OF FORM SURFACES

Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form-coating compounds only with thinning agent of type, and amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

CONCRETE PLACEMENT

Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

Apply temporary protective covering to lower 2' of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.

General: Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

Maintain reinforcing in proper position during concrete placement operations.

Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C), and not more than 80 deg F (27 deg C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

Fog spray forms, reinforcing steel and subgrade just before concrete is placed.

Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

FINISH OF FORMED SURFACES:

Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

MONOLITHIC SLAB FINISHES

Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

After placing slabs, plane surface to tolerances for floor flatness (F_F) of 15 and floor levelness (F_L) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.

Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.

After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of F_F 18 - F_L 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.

After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of F_F 20 - F_L 17. Grind smooth surface defects which would telegraph through applied floor covering system.

Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

Chemical-Hardener Finish: Apply chemical-hardener finish to interior concrete floors where indicated. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water (parts of hardener/water as follows), and apply in 3 coats; first coat, 1/3-strength; second coat, 1/2-strength; third coat, 2/3-strength. Evenly apply each coat, and allow 24 hours for drying between coats.

Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.

After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.

After completion of float finishing, and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.

After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.

Colored Wear-Resistant Finish: Provide colored wear-resistant finish to monolithic slab surface indicated.

Apply dry shake materials for colored wear-resistant finish at rate of not less than 60 lbs. per 100 sq. ft., unless greater amount is recommended by material manufacturer.

Immediately following first floating operation, uniformly distribute approximately 2/3 of required weight of dry shake material over concrete surface, and embed by means of power floating. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material at right angles to first application, and embed by power floating.

After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by dry shake hardener manufacturer. Apply curing compound immediately after final finishing.

CONCRETE CURING AND PROTECTION

General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

Provide moisture curing by following methods.

Keep concrete surface continuously wet by covering with water.

Continuous water-fog spray.

Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

Provide moisture-cover curing as follows:

Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs, as follows:

Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.

Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

SHORES AND SUPPORTS

Comply with ACI 347 for shoring and reshoring in multistory construction, and as herein specified.

Extend shoring at least 3 floors under floor or roof being placed for structures over 4 stories. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimums to ensure proper distribution of loads throughout structure.

Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to safely support work without excessive stress or deflection.

Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

REMOVAL OF FORMS

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28-days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

RE-USE OF FORMS

Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

MISCELLANEOUS CONCRETE ITEMS

Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

CONCRETE SURFACE REPAIRS

Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets;

fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.

Repair methods not specified above may be used, subject to acceptance of Architect.

Underlayment Application: Leveling of floors for subsequent finishes may be achieved by use of specified underlayment material.

QUALITY CONTROL TESTING DURING CONSTRUCTION

The Contractor shall employ a testing laboratory to perform tests and to submit test reports.

Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.

Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.

Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.

Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, and when 80 deg F (27 deg C) and above; and each time a set of compression test specimens made.

Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

When total quantity of a given class of concrete is less than 50 cu. yds., strength test may be waived by Architect if, in his judgement, adequate evidence of satisfactory strength is provided.

When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive

strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION 03310

SECTION 03410 - STRUCTURAL PRECAST CONCRETE

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of structural precast concrete work is shown on drawings and in schedules.

Structural precast concrete includes the following:

Hollow slab units.

RELATED WORK

Cast-in-place concrete is specified in another Division-3 section.

Joint sealants and backing are specified in Division 7.

Applied finishes are specified in Division 9.

SUBMITTALS

Product Data: Submit manufacturer's specifications and instructions for manufactured materials and products. Include manufacturer's certifications and laboratory test reports as required.

Mix Designs: Submit written reports of proposed concrete mix as specified in Part-2 of this section.

Shop Drawings: Submit shop drawings showing complete information for fabrication and installation of precast concrete units. Indicate member dimensions and cross-section; location, size and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.

Indicate layout, dimensions, and identification of each precast unit corresponding to sequence and procedure of installation. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.

Provide location and details of anchorage devices that are to be embedded in other construction. Furnish templates if required for accurate placement.

Include erection procedure for precast units and sequence of erection.

Provide complete design calculations prepared by a registered engineer, licensed in State where project is erected.

Samples: Provide samples of bearing pads in compliance with Division-1 requirements.

QUALITY ASSURANCE

Codes and Standards: Comply with provisions of following codes, specifications and standards, except as otherwise indicated:

ACI 301 "Specifications for Structural Concrete for Buildings".

ACI 318 "Building Code Requirements for Reinforced Concrete".

Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

Prestressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products".

Fabricator Qualifications: Firms which have 2 years successful experience in fabrication of precast concrete units similar to units required for this project will be acceptable. Fabricator must have sufficient production capacity to produce required units without causing delay in work.

Fabricator must be producer member of the Prestressed Concrete Institute (PCI) and/or participate in its Plant Certification Program.

Design by Fabricator: Design precast slab units to support superimposed dead loads and live loads as indicated on drawings and as required for compliance with State Building Code requirements.

Fire-resistance Rated Precast Units: Where precast concrete units are shown or scheduled as requiring a fire-resistance classification, provide units tested and listed by U.L. in "Fire Resistance Directory", or with each unit bearing U.L. label and marking.

DELIVERY, STORAGE AND HANDLING

Deliver precast concrete units to project site in such quantities and at such times to assure continuity of installation. Store units at project site to prevent cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at designated lift points.

Deliver anchorage items which are to be embedded in other construction before start of such work. Provide setting diagrams, templates, instructions and directions as required for installation.

PART 2 - PRODUCTS

FORMWORK

Provide forms and, where required, form facing materials of metal, plastic, wood, or other acceptable material that is non-reactive with concrete and will produce required finish surfaces.

Accurately construct forms, mortar-tight, of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and when prestressed, pretensioning and detensioning operations. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified in PCI MNL 116.

Unless forms for plant-manufactured prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress or to movement during detensioning.

REINFORCING MATERIALS

Reinforcing Bars: ASTM A 615, Grade 60, unless otherwise indicated.

Low-Alloy Steel Reinforcing Bars: ASTM A 706.

Galvanized Reinforcing Bars: ASTM A 767, Class II (2.0 oz. zinc psf), hot-dip galvanized after fabrication and bending.

Steel Wire: ASTM A 82, plain, cold-drawn, steel.

Welded Wire Fabric: ASTM A 185.

Welded Deformed Steel Wire Fabric: ASTM A 497.

Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.

For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

PRESTRESSING TENDONS

Uncoated, 7-wire stress-relieved strand complying with ASTM A 416. Use Grade 250 unless Grade 270 indicated.

Strand similar to above, but having size and ultimate strength of wires increased so that ultimate strength of the strand is increased approximately 15 percent, or strand with increased strength but with fewer number of wires per strand, may be used at manufacturer's option.

CONCRETE MATERIALS

Portland Cement: ASTM C 150, Type I or Type III.

Use only one brand and type of cement throughout project, unless otherwise acceptable to Architect.

Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

> Local aggregates not complying with ASTM C 33, but which have shown by special test or actual service to produce concrete of adequate strength and durability, may be used when acceptable to Architect.

Lightweight Aggregate: ASTM C 330.

Water: Potable.

Air-Entraining Admixture: ASTM C 260.

Water-Reducing Admixture: ASTM C 494, Type A, or other Type approved for fabricator's units.

CONNECTION MATERIALS

Steel Plates: Structural quality, hot-rolled carbon steel, ASTM A 283, Grade C.

Steel Shapes: ASTM A 36.

Anchor Bolts: ASTM A 307, low-carbon steel bolts, regular hexagon nuts and carbon steel washers.

High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon bolts, and hardened washers complying with ASTM A 324.

Finish of Steel Units: Exposed units galvanized per ASTM A 153; others painted with rust-inhibitive primer.

Bearing Pads: Provide bearing pads for precast concrete units as indicated on drawings.

Frictionless Pads: Tetrafluoroethylene (TFE), with glass fiber reinforcing as required for service load bearing stress.

Welding Electrodes: Comply with AWS standards.

Accessories: Provide clips, hangers, and other accessories required for installation of project units and for support of subsequent construction or finishes.

GROUT MATERIALS

Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 404. Mix at ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.

Metallic, Shrinkage-Resistant Grout: Pre-mixed factory-packaged ferrous aggregate grouting compound.

Available Products: Subject to compliance with requirements, products may be incorporated in the work to include, but are not limited to, the following:

Firmix; Euclid Chemical Co.
Embeco 153; Master Builders.
Ferrolith G; Sonneborn/Building Products.
Kemox C; Sika Chemical.
Vibra-Foil; W.R. Grace.

Non-metallic Shrinkage-Resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-C621.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Euco N.S.; Euclid Chemical Co.
Crystex; L&M Construction Chemicals.
Masterflow 713; Master Builders.
Five Star Grout; U.S. Grout Corp.
Upcon, Upco Chem. Div., USM Corp.
Propak; Protex Industries, Inc.
Set Non-Shrink; Set Products, Inc.

PROPORTIONING AND DESIGN OF MIXES

Prepare design mixes for each type of concrete required.

Design mixes may be prepared by an independent testing facility or by qualified precast manufacturing plant personnel, at precast manufacturer's option.

Proportion mixes by either laboratory trail batch or field experience methods, using materials to be employed on the project for each type of concrete required, complying with ACI 318.

Produce standard-weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties.

Compressive strength; 5000 psi minimum at 28 days. Release strength for prestressed units: 3500 psi.

Produce lightweight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:

Compressive strength; 5000 psi minimum at 28 days.
Air-dry density; not less than 90 nor more than 115 lbs. per cu. ft.
Release strength for prestressed units: 3500 psi.

Cure compression test cylinders using same methods as used for cast-in-place concrete work.

Submit written reports to Architect of proposed mix for each type of concrete at least 15 days prior to start of precast unit production. Do not begin concrete production until mixes and evaluations have been reviewed by Architect.

Adjustment to Concrete Mixes: Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by Architect before using in the work.

Admixtures:

Use air-entraining admixture in concrete, unless otherwise indicated.

Use water-reducing admixtures in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete, may be used subject to Architect's acceptance.

Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

FABRICATION

General: Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116, and as specified for types of units required.

Built-in Anchorages: Accurately position built-in anchorage devices and secure to formwork. Locate anchorages where they do not affect position of main reinforcement or placing of concrete. Do not relocate bearing plates in units unless acceptable to Architect.

Cast-in holes for openings larger than 10" diameter or 10" square in accordance with final shop drawings. Other smaller holes will be field cut by trades requiring them, as acceptable to Architect.

Coat surfaces of forms with bond-breaking compound before reinforcement is placed. Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's instructions.

Clean reinforcement of loose rust and mill scale, earth and other materials which reduce or destroy bond with concrete.

Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Pretensioning of tendons for prestressed concrete may be accomplished either by single strand tensioning method or multiple-strand tensioning method. Comply with PCI MNL-116 requirements.

Place concrete in a continuous operation to prevent formation of seams or planes of weakness in precast units, complying with requirements of ACI 304. Thoroughly consolidate placed concrete by internal and external vibration without dislocation or damage to reinforcement and built-in items.

Identification: Provide permanent markings to identify pick-up points and orientation in structure, complying with markings indicated on final shop drawings. Imprint date of casting on each precast unit on a surface which will not show in finished structure.

Curing by low-pressure steam, by steam vapor, by radiant heat and moisture, or other similar process may be employed to accelerate concrete hardening and to reduce curing time.

Delay detensioning of prestressed units until concrete has attained at least 70 percent of design stress, as established by test cylinders.

If concrete has been heat-cured, perform detensioning while concrete is still warm and moist, to avoid dimensional changes which may cause cracking or undesirable stresses in concrete.

Detensioning of pretensioned tendons may be accomplished either by gradual release of tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.

Finish of Formed Surfaces: Provide finishes for formed surfaces of precast concrete as indicated for each type of unit, and as follows:

> Standard Finish: Normal plant run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal form joint marks, and minor chips and spalls will be tolerated, but no major or unsightly imperfections, honeycomb, or structural defects will be permitted.

Finish of Unformed Surfaces: Apply trowel finish to unformed surfaces unless otherwise indicated. Consolidate concrete, bring to proper level with a straightedge, float, and trowel to a smooth, uniform finish.

> Apply scratch finish to precast units which will receive concrete topping after installation. Following initial strikeoff, transversely scarify surface to provide ridges approximately 1/4" deep.

HOLLOW SLAB UNITS

Type: Precast prestressed concrete units with open voids running full length of slabs.

Furnish units which are free of voids or honeycomb, with straight true edges and surfaces.

Provide "Standard Finish" units for formed surfaces and scratch finish to unformed surfaces unless otherwise indicated.

Fabrication: Manufacturer units of concrete materials which will provide a minimum 3500 psi compressive strength at time of initial prestress and a 28-day compressive strength of 5000 psi.

Adequately reinforce slab units to resist transporting and handling stresses.

Include cast-in weld plates where required for anchorage or lateral bracing to structural steel members.

Coordinate with other trades for installation of items to be cast-in hollow slab units.

Provide solid, monolithic precast slab units indicated to be an integral part of hollow slab unit system. Design and fabricate solid units to dimensions and details indicated, as specified for hollow slab units.

Provide headers of cast-in-place concrete or structural steel shapes for openings larger than one slab width in accordance with hollow slab unit manufacturer's recommendations.

SOURCE QUALITY CONTROL

The Contractor shall employ a separate testing laboratory to evaluate precast manufacturer's quality control and testing methods.

The precast manufacturer shall allow Contractor's testing facility access to materials storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with Owner's testing laboratory and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

Dimensional Tolerances: Units having dimensions smaller or greater than required, and outside specified tolerance limits, will be subject to additional testing as herein specified.

Precast units having dimensions greater than required will be rejected if appearance or function of the structure is adversely affected, or if larger dimensions interfere with other construction. Repair, or remove and replace rejected units as required to meet construction conditions.

Strength of Units: The strength of precast concrete units will be considered potentially deficient if the manufacturing processes fail to comply with any of the requirements which may affect the strength of the precast units, including the following conditions.

Failure to meet compressive strength tests requirements.

Reinforcement, and pretensioning and detensioning of tendons of prestressed concrete, not conforming to specified fabrication requirements.

Concrete curing, and protection of precast units against extremes in temperature, not as specified.

Precast units damaged during handling and erection.

Testing Precast Units: When there is evidence that strength of precast concrete units does not meet specification requirements, the concrete testing service shall take cores

drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:

Take at least 3 representative cores from precast units of suspect strength, from locations directed by Architect.

Test cores in a saturated-surface-dry condition per ACI 318 if concrete will be wet during use of completed structure.

Test cores in an air-dry condition per ACI 318 if concrete will be dry during use of completed structure.

Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85 percent of 28-day design compressive strength.

Tests results will be made in writing on same day that tests are made, with copies to Architect, Contractor, and precast manufacturer. Include in test reports the project identification name and number, date, name of precast concrete manufacturer, name of concrete testing service, identification letter, number, and type of member or members represented by core tests, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plan of concrete as placed, and moisture condition of core at time of bearing.

Patching: Where core test results are satisfactory and precast units are acceptable for use in work, fill core holes solid with patching mortar, and finish to match adjacent concrete surfaces.

Defective Work: Precast concrete units which do not conform to specified requirements, including strength, tolerances, and finishes, shall be replaced with precast concrete units that meet requirements of this section. Contractor shall also be responsible for cost of corrections to other work affected by or resulting from corrections to precast concrete work.

PART 3 - EXECUTION

INSTALLATION, GENERAL

Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

Bearing Pads: Install flexible bearing pads where indicated, as precast units are being erected. Set pads on level, uniform bearing surfaces and maintain in correct position until precast units are placed.

Welding: Perform welding in compliance with AWS D 1.1, including qualification of welders.

Protect units from damage by field welding or cutting operations and provide non-combustible shield as required.

Repair damaged metal surfaces by cleaning and applying a coat of liquid galvanizing repair compound to galvanized surfaces and compatible primer to painted surfaces.

Powder-Actuated Fasteners: Do not use powder-actuated fasteners for surface attachment of accessory items in precast, prestressed unit unless otherwise accepted by precast manufacturer.

Erection Tolerances: Install precast units without exceeding following tolerance limits specified in PCI MNL-127 "Recommended Practice for Erection of Precast Concrete".

Grouting Connections and Joints: After precast concrete units have been placed and secured, grout open spaces at connection and joints as follows:

Cement grout consisting of 1 part portland cement, 2-1/2 parts sand, and only enough water to properly mix and for hydration.

Shrinkage-resistant grout consisting of premixed compound and water to provide a flowable mixture without segregation or bleeding.

Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.

END OF SECTION 03410

SECTION 03450 - ARCHITECTURAL PRECAST CONCRETE

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

SUMMARY

Extent of architectural precast concrete work is shown on drawings and in schedules.

Architectural precast concrete includes the following:

Brownstone.

Precast prestressed structural concrete units are specified under another section of Division 3.

Caulking, sealants, and gaskets are specified in Division 7.

SUBMITTALS

Product Data: Submit fabricator's specifications, data and instructions for manufactured materials and products. Include mix designs, certifications and laboratory test reports as required.

Include water absorption test reports for units with exterior exposure.

Shop Drawings: Submit shop drawings showing complete information for fabrication and installation of precast concrete units. Indicate member dimensions and cross-section; fabrication tolerances; location, size and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.

Show layout, dimensions, and identification of each precast unit corresponding to sequence and procedure of installation.

Indicate welded connection by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.

Show caulked joints, including expansion joints ("soft" type) and grouted joints ("rigid" type).

Samples: Submit samples approximately 12" x 12" x 2" to illustrate quality, color, and texture of surface finish.

QUALITY ASSURANCE

Codes and Standards: Comply with provisions of following codes, specifications and standards, except as otherwise indicated:

ACI 318 "Building Code Requirements for Reinforced Concrete".

Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

Prestressed Concrete Institute MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products".

Fabricator Qualifications: Firms which have a minimum of 5 years successful experience in the fabrication of architectural precast concrete units, similar to units required for this project, will be acceptable. Fabricator must have sufficient production capacity to produce, transport, and deliver required units without causing delay in the work.

Fabrication Qualifications: Produce precast concrete units at fabricating plant engaged primarily in manufacturing of similar units, unless plant fabrication or delivery to site is impractical.

DELIVERY, STORAGE AND HANDLING

Deliver precast concrete units to project site in such quantities and at such times to assure continuity of installation. Store units at project site to prevent cracking, distortion, warping, staining, or other physical damage and so that markings are visible. Lift and support units only at designated lifting or supporting points as shown on final shop drawings.

PART 2 - PRODUCTS

FORMWORK

Provide forms and, where required, form facing materials of metal, plastic, wood, or other acceptable material that is non-reactive with concrete and will produce finish surfaces to match existing "brownstone".

Accurately construct forms, mortar-tight, and of sufficient strength to withstand pressures due to concrete placing operations, and temperature changes. Maintain form work to provide completed precast concrete units of shapes, lines and dimensions indicated, within specified fabrication tolerances.

REINFORCING MATERIALS

Galvanized Reinforcing Bars: ASTM A 767, Class II (2.0 oz. zinc psf), hot-dip galvanized after fabrication and bending.

Steel Wire: ASTM A 82, plain, cold-drawn, steel.

Welded Wire Fabric: ASTM A 185.

Welded Deformed Steel Wire Fabric: ASTM A 497.

Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing.

For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

CONCRETE MATERIALS:

Portland Cement: ASTM C 150, Type I or Type III.

Use only one brand, type, and source of supply of cement throughout the project, unless otherwise acceptable to Architect.

Use "buff" color portland cement for facing concrete mix to match existing "brownstone".

Fine Aggregate for Facing Mixes: ASTM C 33; manufactured sand of same material as coarse aggregate, unless otherwise acceptable to Architect.

Pigments: Non-fading, resistant to lime and other alkalies.

Water: Drinkable, free from foreign materials in amounts harmful to concrete and embedded steel.

Air-Entraining Admixture: ASTM C 260.

Water-Reducing Retarding, Accelerating Admixtures: ASTM C 494, Type as selected by Fabricator and containing not more than 0.1% chloride ions.

PROPORTIONING AND DESIGN OF MIXES

Prepare design mixes for each type of concrete required.

Design mixes may be prepared by independent testing facility or by qualified precast manufacturing plant personnel, at precast fabricator's option.

Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each type of concrete required, complying with ACI 318.

Mix: Standard-weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:

Compressive Strength: 5,000 psi minimum at 28 days.

Total Air Content: Not less than 4% nor more than 6%.

Water Absorption: Not to exceed 5% to 6% by weight; except between 3% to 4% for sloping surfaces (sills), for improved weathering staining resistance.

Submit written reports to Architect of proposed mix for concrete at least 15 days prior to start of precast unit production. Do not begin concrete production until mixes and evaluations have been reviewed by Architect.

Adjustment to Concrete Mixes: Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by Architect before using in the work.

Admixtures: Use air-entraining admixture in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete, may be used subject to Architect's acceptance.

Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

FABRICATION

General: Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and following dimensional tolerances, unless otherwise indicated.

Dimensional Tolerances of Finished Units: Overall height and width measured at face adjacent to mold at time of casting:

5' or under: plus or minus 1/16".

Out of square (differences in length of two diagonal measurements): 1/8" per 6' or 1/4" total, whichever is greater.

Thickness: minus 1/8", plus 1/8".

Tolerances of other dimensions not otherwise indicated: numerically greater of plus or minus 1/16" per 10'.

Fabricate units straight, smooth, and true to size and shape, with exposed edges and corners precise and square unless otherwise indicated.

Precast units which are warped, cracked, broken, spalled, stained, or otherwise defective will not be acceptable.

Built-In Items: Provide reglets, slots, holes, and other accessories in units to receive windows, cramps, dowels, reglets, waterstops, flashings, and other similar work as indicated.

Provide inserts and anchorages cast into units, for attachment of loose hardware as required.

Anchorages: Provide loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other miscellaneous steel shapes not provided by other trades, necessary for securing precast units to supporting and adjacent members.

Surface Finish: Fabricate precast units and provide exposed surface finishes acceptable to the Architect to match existing "brownstone".

PART 3 - EXECUTION

INSTALLATION

General: Deliver anchorage items which are to be embedded in other construction before start of such work. Provide setting diagrams, templates, instructions and directions as required for installation.

Do not install precast units until concrete has attained its design compressive strength.

Install under the provisions and requirements of Section 04200 - Unit Masonry.

PERFORMANCE REQUIREMENTS

Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast units as required.

Limitations as to amount of patching which will be permitted is subject to acceptance of Architect.

In addition to above, in-place precast units may be rejected for any one of the following:

Exceeding specified installation tolerances.

Damaged during construction operations.

Exposed-to-view surfaces which develop surface finish deficiencies.

Other defects as listed in PCI MNL-117.

END OF SECTION 03450

SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

Requirements of this section apply to masonry work specified in Division-4 section "Reinforced Unit Masonry".

DESCRIPTION OF WORK

Extent of each type of masonry work is indicated on drawings and schedule.

Types of masonry work required include:

Concrete unit masonry.

Brick masonry.

Brownstone masonry trim in unit masonry walls.

QUALITY ASSURANCE

Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.

Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

Field Constructed Mock Ups: Prior to installation of masonry work, erect sample wall panels to further verify selection made for color and textural characteristics, under sample submittals of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials and construction; build mock-ups to comply with the following requirements:

Locate mock-ups on site in locations indicated or, if not indicated, as directed by Architect.

Build mockups for the following types of masonry in sizes of approximately 6' long by 4' high by full thickness, including face and back-up wythes as well as accessories.

Each type of exposed unit masonry work.

Typical exterior face brick wall.

Typical exterior face brick wall with window opening framed with stone trim.

Where masonry is to match existing, erect panels parallel to existing surface.

Protect mock-ups from the elements with weather resistant membrane.

Retain mock-ups during construction as standard for judging completed masonry work. When directed, demolish mock-ups and remove from site.

SUBMITTALS

Product Data: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.

Shop Drawings: Submit cutting and setting drawings for stone trim showing sizes, profiles and locations of each unit required.

Samples for Initial Selection Purposes: Submit samples of the following materials:

Unit masonry samples in small scale form showing full extent of colors and textures available for each type of exposed masonry unit required.

Colored masonry mortar samples showing full extent of colors available.

Samples for Verification Purposes: Submit the following samples:

Unit masonry samples for each type of exposed masonry unit required; include in each set the full range of exposed color and texture to be expected in completed work.

Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.

Stone trim samples not less than 12" in length showing full range of exposed color and texture to be expected in finish work.

Aluminum weepholes/vents painted in color to match mortar color.

Colored masonry mortar samples for each color required showing the full range of color which can be expected in the finished work. Label samples to indicate type and amount of colorant used.

DELIVERY, STORAGE, AND HANDLING

Deliver masonry materials to project in undamaged condition.

Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

Store cementitious materials off the ground, under cover and in dry location.

Store aggregates where grading and other required characteristics can be maintained.

Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

PROJECT CONDITIONS

Protection of Work: During erection, cover top of walls with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.

Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.

Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

Protect sills, ledges and projections from droppings of mortar.

Cold Weather Protection:

Do not lay masonry units which are wet or frozen.

Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

Remove masonry damaged by freezing conditions.

For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements.

For units with surface temperatures above 32 degrees F (0 degrees C), wet with water heated to above 70 degrees F (21 degrees C).

For units with surface temperatures below 32 degrees F (0 degrees C), wet with water heated to above 130 degrees F (54 degrees C).

Perform the following construction procedures while the work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 degrees F (6 degrees C).

40 degrees F (4 degrees C) to 32 degrees F (0 degrees C):

Mortar: Heat mixing water to produce mortar temperature between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C).

Grout: Follow normal masonry procedures.

32 degrees F (0 degrees C) to 25 degrees F (-4 degrees C):

Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C); maintain temperature of mortar on boards above freezing.

Grout: Heat grout materials to 90 degrees F (32 degrees C) to produce in-place grout temperature of 70 degrees F (21 degrees C) at end of work day.

25 degrees F (-4 degrees C) to 20 degrees F (-7 degrees C):

Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C); maintain temperature of mortar on boards above freezing.

Grout: Heat grout materials to 90 degrees F (32 degrees C) to produce in-place grout temperature of 70 degrees F (21 degrees C) at end of work day.

Heat: both sides of walls under construction using salamanders or other heat sources.

Use windbreaks or enclosures when wind is in excess of 15 mph.

20 degrees F (-7 degrees C) and below:

Mortar: Heat mixing water and sand to produce mortar temperatures between 40 degrees F (4 degrees C) and 120 degrees F (49 degrees C).

Grout: Heat grout materials to 90 degrees F (32 degrees C) to produce in-place grout temperature of 70 degrees F (21 degrees C) at end of work day.

Masonry Units: Heat masonry units so that they are above 20 degrees F (-7 degrees C) at time of laying.

Provide enclosure and auxiliary heat to maintain an air temperature of at least 40 degrees F (4 degrees C) for 24 hours after laying units.

Do not heat water for mortar and grout to above 160 degrees F (71 degrees C).

Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry temperature ranges apply to anticipated minimum night temperatures.

40 degrees F (4 degrees C) to 32 degrees F (0 degrees C):

Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

32 degrees F (0 deg. C) to 25 deg. F (-4 deg. C):

Completely cover masonry with weather-resistive membrane for at least 24 hours.

25 degrees F (-4 degrees C) to 20 degrees F (-7 degrees C):

Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

20 degrees (-7 degrees) and below:

Except as otherwise indicated, maintain masonry temperature above 32 degrees F (0 degrees C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven

to be satisfactory. For grouted masonry maintain heated enclosure to 40 degrees F (4 degrees C) for 48 hours.

ALLOWANCES

Furnish face brick under allowances specified in Division-1 section "Allowances".

PART 2 - PRODUCTS

BRICK MADE FROM CLAY

General: Comply with referenced standards and other requirements indicated below applicable to each form of brick required.

Size: Provide bricks manufactured to the following actual dimensions:

Sized to match existing brick.

Provide special molded shapes where indicated and for application requiring brick of form, size and finish on exposed surfaces which cannot be produced from standard brick sizes by sawing.

For sills, caps and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncored or unfrogged units with all exposed surfaces finished.

Facing Brick: ASTM C 216 as follows:

Grade SW.

Type FBX (minimum range of size and color variations).

Compressive Strength: 8,000 psi, average, per ASTM C 67.

Application: Use where brick is exposed, unless otherwise indicated.

Texture and Color: As selected by the Architect.

Building Common Brick: ASTM C 62, and as follows:

Grade SW.

Application: Use where brick is indicated for concealed locations.

CONCRETE MASONRY UNITS

General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.

Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

Provide bullnose units for outside corners unless otherwise indicated.

Concrete Block: Provide units complying with characteristics indicated below for Grade, Type, face size, exposed face and, under each form included, for weight classification.

Grade N.

Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thicknesses indicated.

Type I, moisture-controlled units.

Cure units by autoclave treatment at a minimum temperature of 350 degrees F (17 degrees C) and a minimum pressure of 125 psi.

Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

Hollow Loadbearing Block: ASTM C 90 and as follows:

Weight Classification: Normal weight.

Solid Loadbearing Block: ASTM C 145 and as follows:

Weight Classification: Normal weight.

Concrete Building Brick: Provide units complying with ASTM C 55 and characteristics indicated below for grade, type, size and weight classification.

Grade: Same as indicated for concrete block.

Type: Same as indicated for concrete block.

Size: As indicated.

Weight Classification: Normal weight.

BROWNSTONE TRIM UNITS

As specified in Section 03450 - Architectural Precast Concrete. Furnish brownstone trim units in accordance with the requirements of Section 03450. Install in accordance with the requirements of this section.

MORTAR AND GROUT MATERIALS

Portland Cement: ASTM C 150, Type I, except Type III may be used for cold weather construction. Provide natural color or white cement as required to produce required mortar color.

For colored pigmented mortars use premixed colored masonry cements of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations.

Available Products: Subject to compliance with requirements, masonry cements which may be incorporated in the work include, but are not limited to, the following:

"Atlas Custom Color Masonry Cement"; Lehigh Portland Cement Co.
"Flamingo Color Masonry Cement"; The Riverton Corporation.

Hydrated Lime: ASTM C 207, Type S.

Aggregates for Mortar: ASTM C 144, except for joints less than 1/4" use aggregate graded with 100% passing the No. 16 sieve.

Aggregate for Grout: ASTM C 404.

Colored Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

Available Products: Subject to compliance with requirements, colored mortar pigments which may be incorporated in the work include, but are not limited to, the following:

"SGS Mortar Colors"; Solomon Grind-Chem Service, Inc.
"True Tone Mortar Colors"; Davis Colors, A Subsidiary of Rockwood Industries, Inc.

Water: Clean and potable.

JOINT REINFORCMENT, TIES AND ANCHORING DEVICES

Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:

Zinc-Coated (galvanized) Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 641 for zinc coating of class indicated below:

Class 3 (0.80 oz. per sq. ft. of wire surface).

Application: Use for masonry not exposed to exterior or earth.

Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 153, Class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.

Application: Use for masonry exposed to exterior and in contact with earth.

Zinc-Coated (Galvanized) Steel Sheet: Carbon steel with zinc coating complying with ASTM A 525, Coating Designation G90.

Application: Use for dovetail slots and where indicated.

Hot-Dip Galvanized Carbon Steel Sheet: ASTM A 366, Class 2 or ASTM A 635; hot dip galvanized after fabrication to comply with ASTM A 153; Class B.

Application: Use for anchors.

Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.

Wire Size for Side Rods: 0.1875" diameter.

Wire Size for Cross Rods: 0.1483" diameter.

For single-wythe masonry provide type as follows with single pair of side rods:

Truss design with perpendicular cross rods spaced not more than 16" o.c.

For multi-wythe masonry provide type as follows:

Truss design with diagonal cross rods spaced not more than 16" o.c. and number of side rods as follows:

Number of Side Rods for Multiple-Wythe Brick Masonry: One side rod for each wythe.

Use units with adjustable 2-piece rectangular ties where horizontal joints of facing wythe do not align with those of back-up.

Bent-Wire Ties: Provide individual prefabricated bent-wire units complying with requirements indicated below:

Wire Size: 0.1875" diameter.

Length: Provide units of length indicated but not less than that required for embedment into each wythe of 1.5" for solid units and for embedment of tie end into face shells of hollow units, with not less than 5/8" mortar cover on exterior face joints, 1/2" elsewhere.

Tie Shape for Hollow Masonry Units Laid with Cells Vertical: Rectangular with ends welded close and not less than 2" wide.

Tie Shape for Solid Masonry Unit Construction: Z-shaped ties with ends bent 90 deg. to provide hooks not less than 2" long.

Type for Masonry Where Coursing Between Wythes Align: Unit ties bent from one piece of wire.

Type for Masonry Where Coursing Between Wythes Does Not Align: Adjustable ties composed of two parts, one with a pintle, the other with an eye.

Flexible Anchors: Where flexible anchors are indicated for connecting masonry to structural framework, provide 2-piece anchors as described below which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall.

For anchorage to steel framework provide manufacturer's standard anchors with crimped 1/4" diameter wire anchor section for welding to steel and triangular-shaped wire tie section sized to extend within 1" of masonry face.

Wire Size: 0.1875" diameter.

Masonry Veneer Anchors: Two-piece assemblies which permit vertical or horizontal differential movement between wall and framework parallel to, but resist tension and compression forces perpendicular to, plane of wall; consisting of wire tie section and

metal anchor section for attachment over sheathing to metal studs and complying with the following requirements.

Wire Size: 0.1875" diameter.

Wire Tie Shape: Rectangular.

Wire Tie Length: As required to extend within 1" of masonry veneer face.

Anchor Section: Rib-stiffened sheet metal plate with screw holes top and bottom, 0.0747" (14 gage) x 2-3/4" x 3" high fabricated into tee shape with 2 projecting tabs, 3/4" wide by 1" long, with slotted holes for connection of vertical legs of triangular wire tie specially formed to fit anchor section.

Metal Fasteners for Steel Studs: Steel drill screws, #10 diameter x length required to penetrate steel stud flange by not less than 3 exposed threads, complying with ASTM C 954 except with hex washer head and neoprene washer, cadmium-plated.

Available Products: Subject to compliance with requirements, masonry veneer anchors which may be incorporated in the work includes, but is not limited to, the following:

"D/A 213; Dur-O-Wal, Inc.
"DW-10"; Hohmann & Barnard, Inc.
"DW-10HS"; Hohmann & Barnard, Inc.

Rigid Anchors: Provide straps of form and length indicated, fabricated from sheet metal strips of following width and thickness, unless otherwise indicated.

Width: 1-1/4".
Thickness: 3/16".

Unit Type Masonry Inserts in Concrete: Furnish cast iron or malleable iron inserts of type and size indicated.

Dovetail Slots: Furnish dovetail slots, with filler strips, of slot size indicated, fabricated from 0.0336" (22 gage) sheet metal.

Anchor Bolts: Provide steel bolts with hex nuts and flat washers complying with ASTM A 307, Grade A, hot-dip galvanized to comply with ASTM C 153, Class C, in sizes and configurations indicated.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

AA Wire Products Co.
Dur-O-Wall, Inc.
Heckman Building Products, Inc.

Hohmann & Barnard, Inc.
Masonry Reinforcing Corp. of America
National Wire Products Corp.

CONCEALED FLASHING MATERIAL

Sheet Metal Flashing: Fabricate from the following metal complying with requirements specified in Division-7 section "Flashing and Sheet Metal" and below:

Laminated Flashing: Manufacturer's standard laminated flashing of type indicated below:

Copper-Fabric Laminate: Copper sheet of weight per sq. ft. indicated below, bonded with asphalt between 2 layers of glass fiber cloth.

Weight: 5 oz.

Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Copper Fabric Laminate Flashing:

Copper Fabric; Afco Products Inc.
Copper Fabric; Sandell Manufacturing Co., Inc.
Copper Fabric Flashing; York Manufacturing, Inc.

MISCELLANEOUS MASONRY ACCESSORIES

Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade RE41E1, capable of compression up to 35%, of width and thickness indicated.

Premolded Control Joint Strips: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

Polyvinyl chloride complying with ASTM D 2287, General Purpose Grade, Designation PVC-63506.

Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type 1 (No. 15 asphalt felt).

Weepholes: Provide the following for weepholes:

Cotton Cord: Sash cord of length required to produce 2" exposure on exterior and 18" in cavity between wythes.

MASONRY CLEANERS

Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.

MORTAR AND GROUT MIXES

General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellant agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

Do not use calcium chloride in mortar or grout.

Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

Limit cementitious materials in mortar to portland cement-lime.

Use Type M mortar for masonry below grade and in contact with earth, and where indicated.

Use Type S mortar for reinforced masonry and where indicated.

Use Type N mortar for exterior, above-grade loadbearing and non-loadbearing walls; for interior loadbearing walls; and for other applications where another type is not indicated.

Colored Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1-to-10, by weight.

Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of reinforced and nonreinforced unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout.

Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.

Use coarse grout in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

PART 3 - EXECUTION

INSTALLATION, GENERAL

Wetting Clay Brick: Wet brick made from clay or shale which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure each clay masonry unit being nearly saturated but surface dry when laid.

Do not wet concrete masonry units.

Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

Thickness: Build cavity and composite walls, floors and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.

Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

Use dry cutting saws to cut concrete masonry units.

Matching Existing Masonry Work: Match coursing, bonding, color and texture of new masonry work with existing work.

CONSTRUCTION TOLERANCES

Variation from Plumb: For vertical lines and surfaces of columns, walls and arrises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.

Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20'

maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

Variation of Linear Building Line: For position shown in plain and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".

Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

LAYING MASONRY WALLS

Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate opening, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

Pattern Bond: Lay exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4" horizontal face dimensions at corners or jambs.

Stopping and Resuming Work: Rack back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.

Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

At exterior frames insert extruded polystyrene board insulation around perimeter of frame in thickness indicated but not less than 3/4" to act as a thermal break between frame and masonry.

Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

Fill cores in hollow masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

MORTAR BEDDING AND JOINTING

Lay solid brick-size masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

Set stone units in full bed of mortar with all vertical joints slushed full. Fill dowel, anchor and similar holes solid. Wet stone joint surface thoroughly before setting; for stone surfaces which are soiled, clean bedding and exposed surfaces with fiber brush and soap powder followed by thorough rinsing with clear water.

Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.

Tool exposed joints slightly concave using a jointer larger than joint thickness, unless otherwise indicated.

Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

Use individual metal ties installed in horizontal joints to bond wythes together. Provide ties as shown, but not less than one metal tie for 4 sq. ft. of wall area spaced not to exceed 24" o.c. horizontally and vertically. Stagger ties in alternate courses. Provide additional ties within 1' - 0" of all openings and space not more than 3'-0" apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24" o.c. vertically.

Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.

Use either of the structural bonding systems specified above as indicated.

Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.

For horizontally reinforced masonry, provide continuity at corners with prefabricated "L" units, in addition to masonry bonding.

Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:

Provide individual metal ties at not more than 24" o.c. vertically.

Provide continuity with horizontal joint reinforcement using prefabricated "T" units.

Intersecting Load-bearing Walls: If carried up separately, block or tooth vertical joint with 8" maximum offsets and provide rigid steel anchors spaced not more than 4'-0" o.c. vertically, or omit blocking and provide rigid steel anchors at not more than 2'-0" o.c. vertically. Form anchors of galvanized steel not less than 1-1/2" x 1/4" x 2'-0" long with ends turned up not less than 2" or with cross-pins. If used with hollow masonry units, embed ends in morter-filled cores.

Non-bearing Interior Partitions: Build full height of story to underside of solid floor or roof structure above, unless otherwise shown.

Wedge non-bearing partitions against above with small pieces of tile, slate or metal. Fill joint with mortar after dead load deflection of structure above approaches final position.

CAVITY WALLS

Keep cavity clean of mortar droppings and other materials during construction. Strike joints facing cavity flush.

Tie exterior wythe to back-up with individual metal ties spaced not more than 18" o.c. vertically and 24" o.c. horizontally. Stagger alternate courses.

Provide weep holes in exterior wythe of cavity wall located immediately above ledges and flashing, spaced 2'-0" o.c., unless otherwise located.

Cover cavity side of weep hole with copper or plastic insect screening before loose-fill masonry insulation is placed in cavity.

HORIZONTAL JOINT REINFORCEMENT

General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in morter for their entire length with a minimum cover of 5/8" exterior side of walls, 1/2" elsewhere. Lap reinforcing a minimum of 6".

Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

Reinforce walls with continuous horizontal joint reinforcing unless specifically noted to be omitted.

Reinforce the following walls with continuous horizontal joint reinforcement:

Single wythe walls.

Multi-wythe walls with one or more stack bond wythes.

Hollow concrete masonry walls.

Multi-wythe masonry walls.

Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

Space continuous horizontal reinforcement as follows:

For multi-wythe walls (solid or cavity) which are structurally bonded by masonry headers or individual wire ties, space horizontal reinforcement 24" o.c. vertically.

For multi-wythe walls (solid or cavity) where continuous horizontal reinforcement acts as structural bond or tie between wythes, space reinforcement as required by code but not more than 16" o.c. vertically.

For single-wythe walls, space reinforcement at 16" o.c. vertically, unless otherwise indicated.

Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.

In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

ANCHORING MASONRY WORK

General: Provide anchor devices of type indicated.

Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

Provide an open space not less than 1" in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.

Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.

Space anchors as indicated, but not more than 24" o.c. vertically and 36" o.c. horizontally.

Anchor single wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:

Fasten each anchor section through sheathing to metal studs with 2 metal fasteners of type indicated.

Embed tie section in masonry joints. Provide not less than 1" air space between back of masonry veneer wythe and face of sheathing.

Locate anchor section relative to course in which tie section is embedded to allow maximum vertical differential movement of tie up and down.

Space anchors as indicated but not more than 16" o.c. vertically and 24" o.c. horizontally. Install additional anchors within 1'-0" of openings and at intervals around perimeter not exceeding 3'-0".

CONTROL AND EXPANSION JOINTS

General: Provide vertical and horizontal expansion, control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

Build flanges of metal expansion strips into masonry. Lap each joint 4" in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints, if any.

Build flanges of factory-fabricated expansion joint units into masonry. See Division-7 section "Elastic Expansion Joints".

Build-in non-metallic joint filler where indicated.

Build in horizontal pressure relieving joints where indicated; construct joints by either leaving an air space or inserting non-metallic compressible joint filler of width required to permit installation of sealant and backer rod.

Locate horizontal pressure relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

LINTELS

Install steel lintels where indicated.

Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

For hollow concrete masonry unit walls, use specially formed U-shaped lintel units with reinforcement bars placed as shown filled with coarse grout.

Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

FLASHING OF MASONRY WORK

General: Provide concealed flashing in masonry work at, or above, shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.

Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4", and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills turn up ends not less than 2" to form a pan.

Interlock end joints of deformed metal flashings by over-lapping deformations not less than 1-1/2" and seal lap with elastic sealant.

Install flashing to comply with manufacturer's installation.

Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings. Space 24" o.c., unless otherwise indicated.

Install reglets and nailers for flashing and other related work where shown to be built into masonry work.

INSTALLATION OF REINFORCED UNIT MASONRY

Refer to Division-4 sections "Reinforced Unit Masonry" for installation requirements applicable to reinforced unit masonry.

FIELD QUALITY CONTROL

Contractor shall employ, at his own expense, a testing laboratory acceptable to the Architect experienced in performing types of masonry field quality control tests for masonry indicated.

Unit Test Method:

Brick Tests: For each type and grade of brick indicated, test units by methods of sampling and testing of ASTM C 67 except select 5 bricks at random for each 100,000 units or fraction thereof installed.

Concrete Masonry Unit Tests: For each type, class and grade of concrete masonry unit indicated, test units by method of sampling and testing of ASTM C 140.

Mortar Tests: For each type indicated, test mortar by methods of sampling and testing of ASTM C 780. Conduct tests no less frequently than that required to evaluate mortar used to install each increment of masonry units indicated above from which samples are taken for testing.

Prism Test Method:

Compression Test: For each type of wall construction indicated for testing, test masonry prisms by methods of sampling and testing of ASTM E 447, Method B, and as follows:

Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

For brick masonry prisms provide same height-to-thickness ration (h/t) as specified under preconstruction testing.

For concrete masonry prisms provide same height-to-thickness ration (h/t) as specified under preconstruction testing.

Construct tests no less frequently than that required to provide sets of prisms from each 5000 sq. ft. of wall area installed.

Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.

Evaluation of Quality Control Tests: Masonry work, in absence of other indications of noncompliance with requirements, will be considered satisfactory if results from construction quality control tests comply with minimum requirements indicated.

REPAIR, POINTING, AND CLEANING

Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new

units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:

Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.

Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner indicated below.

Detergent.

Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable to NCMA "Tek" bulletins.

Clean brownstone units to comply with requirements for cleaning brick masonry.

Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

END OF SECTION 04200

SECTION 04230 - REINFORCED UNIT MASONRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

Requirements of Section "Unit Masonry" apply to work of this section.

DESCRIPTION OF WORK

Extent of each type of reinforced unit masonry work is indicated on drawings and in schedules.

SUBMITTALS

Mill Certificates: Submit steel producer's certificates of mill analysis, tensile and bend tests for reinforcement steel required for project.

PART 2 - PRODUCTS

General: Refer to Section "Unit Masonry" for masonry materials and accessories not included in this section.

Reinforcement Bars: Provide deformed bars to following grades complying with ASTM A 615, except as otherwise indicated.

Provide Grade 60 for bars No. 3 to No. 18, except as otherwise indicated.

Shop-fabricate reinforcement bars which are shown to be bent or hooked.

PART 3 - EXECUTION

PLACING REINFORCEMENT

General: Clean reinforcement loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

Position reinforcing accurately at the spacing indicated. Support secure vertical bars against displacement. Horizontal reinforcing may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1" (whichever is greater).

For columns, piers and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2", whichever is greater. Provide lateral ties as indicated.

Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Architect. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.

Provide not less than minimum lap shown, or if not shown, as required by governing code.

Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 5/8" on exterior face of walls and 1/2" at other locations.

Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 5/8" on exterior face of walls and 1/2" at other locations. Lap units not less than 6" at ends. Use prefabricated "L" and "T" units to provide continuity at corners and intersections. Cut and bend units as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

Anchoring: Anchor reinforced masonry work to supporting structure as indicated.

Anchor reinforced masonry walls to non-reinforced masonry where they intersect.

INSTALLATION, GENERAL

Refer to Section "Unit Masonry" for general installation requirements to unit masonry.

Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of reinforced masonry.

Do not remove forms and shores until reinforced masonry member have hardened sufficiently to carry their own weight and all other reasonable temporary loads that may be placed on them during construction.

Allow not less than the following minimum time to elapse after completion of members before removing shores or forms, provided suitable curing conditions have been obtained during the curing period.

10 days for lintels, girders and beams.

INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

General:

Do not wet concrete masonry units (CMU).

Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 3/8" joints.

Where solid CMU units are shown, lay with full mortar head and bed joints.

Walls:

Pattern Bond: Lay CMU wall units in 1/2 running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special-shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.

Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimensions indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.

Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.

Option: Where all vertical cores are not shown to be grouted, Contractor may elect to fill all vertical cores with grout. In which case, requirements for mortar bedding of cross-webs and closing of core spaces below bond beams do not apply.

Columns, Piers and Pilasters:

Use CMU units of the size, shape and number of vertical core spaces shown. If not shown, use units which provide minimum clearances and grout coverage for number and size of vertical reinforcement bars shown.

Provide pattern bond shown, or if not shown, alternate head joints in vertical alignment.

Where bonded pilaster construction is shown, lay wall and pilaster units together to maximum pour height specified.

Grouting:

Use "Fine Grout" per ASTM C 476 for filling spaces less than 4" in one or both horizontal directions.

Use "Coarse Grout" per ASTM C 476 for filling 4" spaces or larger in both horizontal directions.

Grouting Technique: At the Contractor's option, use either low-lift or high-lift grouting techniques subject to requirements which follow.

Low-Lift Grouting:

Provide minimum clear dimension of 2" and clear area of 8 sq. in. in vertical cores to be grouted.

Place vertical reinforcement prior to laying of CMU. Extend above elevation of maximum pour height as required for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 10 ft.

Lay CMU to maximum pour height. Do not exceed 5' height, or if bond beam occurs below 5' height stop pour at course below bond beam.

Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-1/2" below top course of pour.

Bond Beams: Stop grout in vertical cells 1-1/2" below bond beam course. Place horizontal reinforcing in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

High-Lift Grouting:

Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension is 3" and 10 sq. in., respectively.

Provide cleanout holes in first course at all vertical cells which are to be filled with grout.

Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.

Construct masonry to full height of maximum grout pour specified, prior to placing grout.

Limit grout lifts to a maximum height of 5' and grout pour to a maximum height of 24', for single wythe hollow concrete masonry walls, unless otherwise indicated.

Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 10'.

Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcing bar, pull loops and bar to proper position and tie free ends.

Where reinforcement is prefabricated into cage units before placing, fabricate units with vertical reinforcement bars and lateral ties of the size and spacing indicated.

Place horizontal beam reinforcement as the masonry units are laid.

Embed lateral tie reinforcement in mortar joints where indicated. Place as masonry units are laid, at vertical spacing shown.

Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8 gage wire ties spaced 16" o.c. for members with 20" or less side dimensions, and 8" o.c. for members with side dimensions exceeding 20".

Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcing and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.

Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.

Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 5'. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.

Place grout in lintels or beams over openings in one continuous pour.

Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1" of vertically reinforced cavities, during construction of masonry.

When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2" of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

END OF SECTION 04230

SECTION 04500 - MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of masonry restoration work is indicated on drawings and in schedules.

Masonry restoration work includes the following:

Removal of plant growth.

Repairing damaged masonry.

Cleaning exposed masonry surfaces.

Repointing mortar joints.

Repairing stonework.

Masonry construction is specified in other Division-4 sections.

Joint sealers are specified in a Division-7 section.

QUALITY ASSURANCE

Restoration Specialist: Work must be performed by a firm having not less than 5 years successful experience in comparable masonry restoration projects and employing personnel skilled in the restoration processes and operations indicated.

Field-Constructed Mock-Ups: Prior to start of general masonry restoration, prepare the following sample panels on building where directed by Architect. Obtain Architect's acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.

Cleaning: Demonstrate materials and methods to be used for cleaning each type of masonry surface and condition on sample panels of approximately 25 sq. ft. in area.

Test adjacent non-masonry materials for possible reaction with cleaning materials.

Allow waiting period of duration indicated, but not less than 7 calender days, after completion of sample cleaning to permit study of sample panels for negative reactions.

Repointing: Prepare 2 separate sample areas of approximately 3' high by 6' wide for each type of repointing required, one for demonstrating methods and quality of workmanship expected in removal of mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.

Masonry & Stonework Repair: Prepare sample areas of size directed by the Architect for each type of masonry & stonework material to be patched, rebuilt or replaced to demonstrate quality of materials and workmanship.

Source of Materials: Obtain materials for masonry restoration from a single source for each type material required (face brick, stone, cement, sand, etc.) to ensure match of quality, color, pattern, and texture.

SUBMITTALS

Product Data: Submit manufacturer's technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.

Restoration Program: Submit written program for each phase of restoration process including protection of surrounding materials on building and site during operations. Describe in detail materials, methods and equipment to be used for each phase of restoration work.

If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide written description, including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this project.

DELIVERY, STORAGE AND HANDLING

Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons. Unload and handle to prevent chipping and breakage.

Deliver other materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

Protect masonry restoration materials during storage and construction from wetting by rain, snow or ground water, and from staining or intermixture with earth or other types of materials.

Protect grout, mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

PROJECT CONDITIONS

Clean masonry surfaces only when air temperatures are 40 deg.F (4 deg.C) and above and will remain so until masonry has dried out, but for not less than 7 days after completion of cleaning.

Do not repoint mortar joints or repair masonry unless air temperatures are between 40 deg.F (4 deg.C) and 80 deg.F (27 deg.C) and will remain so for at least 48 hours after completion of work.

Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.

Protect sills, ledges and projections from mortar droppings.

SEQUENCING/SCHEDULING

Perform masonry restoration work in the following sequence:

Repair existing masonry including replacing existing masonry with new masonry materials.

Rake-out existing mortar from joints indicated to be repointed.

Repoint existing mortar joints of masonry requiring repointing.

Clean existing masonry surfaces.

PART 2 - PRODUCTS

MASONRY MATERIALS

Face Brick and Accessories: Reuse existing face brick removed from other location and accessories, including units for lintels, arches, corners, and other special ground, cut, or sawed shapes where required to complete masonry restoration work.

Building Brick: Provide building brick complying with ASTM C 62 for masonry work concealed from view, of same vertical dimension as face brick.

Grade SW where in contact with earth.

Grade SW, MW, or NW for concealed back-up.

Stone: Provide natural building stone of type (classification) and with color, surface texture and size to match existing.

MORTAR MATERIALS

Portland Cement: ASTM C 150, Type I.

For stonework and other masonry indicated, provide non-staining white cement complying with staining requirement of ASTM C 91 for not more than 0.03% water soluble alkali.

Hydrated Lime: ASTM C 207, Type S.

Aggregate for Mortar: ASTM C 144, unless otherwise indicated.

Colored Mortar Aggregate: Natural or manufactured sand selected to produce mortar color indicated.

For pointing mortar provide sand with rounded edges.

Match size, texture and gradation of existing mortar as closely as possible.

Colored Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

Water: Clean, free of oils, acids, alkalis and organic matter.

Aggregate for Grout: ASTM C 404.

CLEANING MATERIALS AND EQUIPMENT

Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.

Brushes: Fiber bristle only.

Alkaline Prewash Cleaner: Manufacturer's standard alkaline cleaner for prewash applications only which are followed by acidic cleaner of type indicated for afterwash.

Product: Subject to compliance with requirements, provide "Sure Klean 766 Prewash," ProSoCo, Inc.

Acidic Cleaner: Manufacturer's standard strength acidic masonry restoration cleaner composed of hydrofluoric acid blended with other acids including trace of phosphoric acid and combined with special wetting systems and inhibitors.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Diedrich 101 Masonry Restorer," Diedrich Chemicals.

"Sure Klean Restoration Cleaner," ProSoCo, Inc.

Two-Part Limestone Cleaner: Manufacturer's standard two-part system consisting of alkaline cleaner for prewash and acidic cleaner for afterwash.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Diedrich Limestone Cleaner Prerinse and Afterrinse"; Diedrich Chemicals.

"Sure Klean Limestone Prewash and Afterwash", ProSoCo, Inc.

Chemical Paint Remover: Manufacturer's standard thixotropic/alkaline formulation for removing paint coatings from masonry.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

"Diedrich 505/606/606X Paint Remover"; Diedrich Chemicals.

"Sure Klean Heavy-Duty Paint Stripper"; ProSoCo, Inc.

Liquid Strippable Masking Agent: Manufacturer's standard liquid, film forming, strippable masking material for protecting glass, metal and polished stone surfaces from damaging effect of acidic and alkaline masonry cleaners.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work included, but are not limited to, the following:

"Diedrich Acid Guard"; Diedrich Chemicals.

"Sure Klean Acid Stop"; ProSoCo, Inc.

Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated for pressure, measured at spray tip, and for volume.

For spray application of water provide fan-shaped spray-tip which disperses water at angle of not less than 15 degrees.

MISCELLANEOUS MATERIALS

Stone-to-Stone Adhesive: Two-part polyester resin stone adhesive with a 15-30 minute cure at 70 deg.F (21 deg.C), in formulation (knife or flowing grade) recommended by adhesive manufacturer for type of stone repair indicated, and in color indicated or, if not otherwise indicated, as selected by Architect from tinted or standard colors available from adhesive manufacturer.

Product: Subject to compliance with requirements, provide "Akemi" adhesives distributed by Wood and Stone, Inc., 7567 Gary Road, Manassas, VA 22110.

Mortar-to-Stone Adhesive: High modulus, high strength, moisture insensitive epoxy adhesive with a pot life of 30 minutes at 40 deg.F (4 deg.C).

Product: Subject to compliance with requirements, provide "Sikadur Hi-Mod Epoxy, Sikastix 370"; Sika Chemical Corporation.

Stone Anchors: Type and size indicated or, if not indicated, to match existing in size and type. Fabricate anchors and dowels from AISI Type 302/304 stainless steel.

MORTAR MIXES

General:

Measurement and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel, use known measure. Mix materials in a clean mechanical batch mixer.

Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix which will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1-to-2 hours. Add remaining water in small portions until mortar of desired consistency is

reached. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

Colored Mortar: Produce mortar of color required by use of selected ingredients. Do not adjust proportions without Architect's approval.

Color Pigmented Mortar: Where colored mortar pigments are indicated do not exceed pigment-to-cement ratio of 1-to-10, by weight.

Do not use admixtures of any kind in mortar, unless otherwise indicated.

Mortar Proportions:

Pointing Mortar for Brick: One part white portland cement, 2 parts lime and 6 parts colored mortar aggregate.

Add colored mortar pigment to product mortar colors required.

Pointing Mortar for Stone: One part white portland cement, 1 part lime, 6 parts colored mortar aggregate.

Add colored mortar pigment to produce mortar color required.

Rebuilding Mortar: Same as pointing mortar.

Rebuilding Mortar: Comply with ASTM C 270, Proportion Specification, Type N, unless otherwise indicated with cementitious material content limited to portland cement-lime.

Patching Mortar for Stone: Provide mix composed of white and gray cement combined with lime and selected aggregates to produce color matching color of existing stone. Proportion mix with 2 parts cement, 2 parts lime and 6 parts aggregate.

Grout: ASTM C 476.

CHEMICAL CLEANING SOLUTIONS

General: Unless otherwise indicated, dilute chemical cleaning materials with water to produce solutions of concentration indicated but not greater than that recommended by chemical cleaner manufacturer.

Acidic Cleaner Solution for Brick: Maximum hydrofluoric acid content: 3%.

Acidic Cleaner Solution for Unpolished Stone: Maximum hydrofluoric acid content: 3%.

Use acidic cleaner only on unpolished granite, unpolished dolomite marbles, and siliceous sandstone.

Alkaline Cleaner for Prewash of Limestone: In concentration recommended by chemical cleaner manufacturer.

Use alkaline cleaner only on calcite limestone as prewash.

Acid Cleaner for Afterwash of Limestone: In concentration recommended by chemical cleaner manufacturer.

Use above type only on calcite limestone as afterwash.

Chemical Paint Remover: In concentration recommended by chemical cleaner manufacturer.

PART 3 - EXECUTION

PREPARATION

General: Comply with recommendations of manufacturers of chemical cleaners for protecting building surfaces against damage from exposure to their products.

Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.

Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings and other surfaces which could be injured by such contact.

Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.

Dispose of run-off from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during course of masonry restoration work.

Protect glass, unpainted metal trim and polished stone from contact with acidic chemical cleaners by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces.

Protection can be eliminated subject to Architect's approval, if testing demonstrates no detrimental effect from exposure to cleaning solutions.

Protect unpainted metal from contact with alkali chemical cleaners by covering them either with liquid strippable masking agent or polyethylene film and waterproof masking tape.

CLEANING EXISTING MASONRY, GENERAL

Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.

Use only those cleaning methods indicated for each masonry material and location.

Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.

Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.

Removal of Plant Growth: Remove plant, moss and shrub growth completely from masonry surfaces. Carefully remove plants, creepers and vegetation by cutting at roots and allowing to dry as long as possible prior to removal. Remove loose soil or debris from open masonry joints to whatever depth it occurs.

Apply ammonium sulfamate or other acceptable root killing material to plant roots, in accordance with manufacturer's instructions. Do not apply materials to plants or vegetation to remain.

Water Application Methods:

Prolonged Spraying: Soak masonry surfaces by applying water continuously and uniformly to limited area for time period indicated. Apply water at low pressures and low volumes in form of multiple fine sprays using perforated hoses or multiple spray nozzles. Erect protective enclosure constructed of polyethylene sheeting to cover area being sprayed.

Spray Applications: Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume and equipment. Unless otherwise indicated, hold spray nozzle not less than 6" from surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.

Low Pressure Spray: 100-400 psi; 3-6 gallons per minute.

Chemical Cleaner Application Methods:

General: Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendations using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than that indicated or recommended by manufacturer.

Spray Application: Apply to pressures not exceeding 50 psi, unless otherwise indicated.

Reapplication of Chemical Cleaners: Do not apply chemical cleaners to same masonry surfaces more than twice. If additional cleaning is required use steam wash.

CLEANING BRICKWORK:

Cold Water Wash: At locations indicated, clean brick masonry surface with cold water applied as follows:

Low pressure spray.

Chemical Cleaning: At locations indicated, clean brick masonry surfaces with acidic cleaner applied as follows:

Prewet masonry with cold water applied by low pressure spray.

Apply acidic cleaner to masonry. Let cleaner remain on surface for period indicated below before rinsing away:

As recommended by chemical cleaner manufacturer.

Rinse masonry with cold water to remove chemicals and soil, applied as follows:

Low pressure spray.

Repeat chemical cleaning procedure above where required to produce effect established by mock-up. Do not apply more than twice.

Paint Removal: At locations indicated, remove paint from masonry surfaces as follows:

Apply chemical paint remover to painted masonry with brushes.

Allow chemical paint remover to remain on surfaces for period recommended by paint remover manufacturer.

Remove chemical and paint residue by rinsing with cold applied as follows:

Low pressure spray.

Apply acidic cleaner as an afterwash to masonry while it is still wet using low pressure spray equipment or soft fibered brush. Let cleaner remain on surface for period recommended by manufacturer, unless otherwise indicated.

Rinse masonry with cold water to remove chemicals and soil, applied as follows:

Low pressure spray.

Paint Removal with Water-Rinsible Chemical Paint Remover: At locations indicated, remove paint from masonry surfaces as follows:

Apply thick coating of water-rinsible chemical paint remover to painted masonry with natural fiber cleaning brush, deep-nap roller, or large paint brush.

Allow chemical paint remover to remain on surface for period recommended by paint remover manufacturer. Agitate periodically with a stiff bristle brush.

Remove chemical and paint residue by rinsing with water applied as follows:

Low pressure spray.

CLEANING STONEWORK

Cold Water Wash: At locations indicated, clean stone surfaces by following procedure.

Prewet masonry with prolonged spraying for duration indicated below.

Continue spraying until surface encrustation has softened sufficiently to permit its removal by water wash.

Remove soil and softened surface encrustation from stone by applying cold water as follows:

Low pressure spray.

Cleaning with Acidic Cleaner: At locations indicated, clean stone surfaces with acidic cleaner of dilution indicated, applied as follows:

Prewet masonry with cold water applied by low pressure spray.

Apply chemical cleaner to stone. Let cleaner remain on surface for period indicated below before rinsing away.

As recommended by chemical cleaner manufacturer.

Rinse stone with cold water to remove chemicals and soil, applied as follows:

Low pressure spray.

Repeat entire cleaning procedure above where required to produce cleaning effect established by mock-up. Do not apply more than twice.

One-Part Chemical Cleaning of Limestone: At locations indicated, clean limestone surfaces with one-part system using one-part limestone cleaner of dilution indicated, applied as follows:

Prewet stone with cold water applied by low-pressure spray.

Apply one-part limestone cleaner to stone by using a soft-fibered brush or low-pressure spray equipment. Let cleaner remain on surface for period recommended by manufacturer.

Immediately repeat application of one-part limestone cleaner as indicated above over the same area.

Rinse stone with cold water to remove chemicals and soil, applied by medium pressure spray.

Two-Part Chemical Cleaning of Limestone: At locations indicated, clean limestone surfaces with two-part systems using chemical cleaners of dilution indicated, applied as follows:

Prewet stone with cold water applied by low pressure spray.

Apply alkaline cleaner for prewash to stone by brush or roller. Let cleaner remain on surface for period recommended by cleaner manufacturer, unless otherwise indicated.

Rinse stone with cold water to remove chemicals and soil, applied by low pressure spray.

Apply acidic cleaner for afterwash to stone while it is still wet using low pressure spray equipment or deep nap roller or soft fibered brush. Let cleaner remain on surface for period recommended by cleaner manufacturer, unless otherwise indicated.

Rinse stone with cold water to remove chemicals and soil, applied by low pressure spray.

Repeat entire cleaning procedure above where required to produce cleaning effect established by mock-up. Do not apply more than twice.

BRICK REMOVAL AND REBUILDING

Brick Removal:

Carefully remove by hand any brick which are damaged, spalled or deteriorated. Cut out full units from joint to joint and in manner to permit replacement with full size units.

Support and protect masonry indicated to remain which surrounds removal area.

Salvage as many whole, undamaged bricks as possible.

Remove mortar, loose particles and soil from salvaged brick by cleaning with brushes and water. Store brick for reuse.

Clean remaining brick at edges of removal areas by removing mortar, dust, and loose debris in preparation for rebuilding.

Brick Rebuilding:

Install salvaged brick to replace removed brick. Fit replacement units into bonding and coursing pattern of existing brick. If cutting is required use motor driven saw designed to cut masonry with clean, sharp unchipped edges.

Lay replacement brick with completely filled bed, head and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet clay brick which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure that units are nearly saturated but surface dry when laid. Maintain joint width for replacement units to match existing.

Repoint new mortar joints in repaired area to comply with requirements for repointing existing masonry, except rake out joints before mortar sets.

STONE REMOVAL AND REPLACEMENT

Carefully remove by hand at locations indicated any stone which has deteriorated, shifted, or is damaged beyond repair.

Remove mortar, loose particles and other debris from salvaged stone and stone surrounding removed units in preparation for resetting.

Replace removed stone with salvaged stone, where possible, or with new stone matching existing, including size. Butter vertical joints for full width before setting and set units in full bed of mortar, unless otherwise indicated.

Repoint new mortar joints to comply with requirements for repointing existing masonry, except rake out joints before mortar sets.

STONE REPAIR

Carefully remove loose stone fragments in areas which are indicated for repair. Reuse only pieces of spalled stone which are in sound condition.

Remove soil, loose stone particles, mortar, and other debris and foreign material from surfaces to be bonded of both fragment and building stone from which it was removed by cleaning with stiff brush.

Apply adhesive to comply with adhesive manufacturer's directions. Coat bonding surface of building stone with stone-to-stone adhesive completely filling all voids and covering all surfaces. Fit stone fragments onto building stone while adhesive is still tacky and hold fragment securely in place until adhesive has cured.

After adhesive has cured fully, further anchor stone fragments larger than 6" x 6" x 6" in any dimension with 1/4" diameter plain stainless steel rods set into 1/4" diameter holes drilled at a 45 deg. downward angle through face of stone. Center and space anchor rods not more than 5" nor less than 3" apart and not less than 2" from any edge. Insert rods not less than 2" into backing stone and 2" into fragment with end countersunk at least 3/4" from exposed face of stone.

Clean any residual adhesive from edges. Wet stone and fill any chipped areas and drill holes with patching mortar. Avoid featheredging. Furnish patched areas to match texture of, and be level with adjoining surrounding stone surfaces. Keep patching mortar damp for 72 hours.

STONE PATCHING

Remove loose particles, soil, debris, oil and other contaminants from existing stone units at locations indicated by cleaning with stiff brush.

Brush coat stone surfaces with mortar-to-stone adhesive to comply with manufacturer's directions.

Place patching mortar in layers no thicker than 2". Roughen surface of each layer to provide key for next.

Keep each layer damp for 72 hours or until mortar has set.

Unacceptable patches are defined as those with hairline cracks or showing separation form stone at edges. Remove patches and refill to provide patches free of those defects.

REPOINTING EXISTING MASONRY

Joint Raking:

Rake out mortar from joints to depths equal to 2-1/2 times their widths but not less than 1/2" nor less than that required to expose sound, unweathered mortar.

Remove mortar from masonry surfaces within rakes-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum or flush joints to remove dirt and loose debris.

Do not spall edges of masonry units or widen joints. Replace any masonry units which become damaged.

Cut out old mortar by hand with chisel and mallet, unless otherwise indicated.

Joint Pointing:

Rinse masonry joint surfaces with water to remove any dust and mortar particles. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off, and joint surfaces are damp but free of standing water.

Apply first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8" until a uniform depth is formed. Compact each layer thoroughly and allow to become thumbprint-hard before applying next layer.

After joints have been filled to a uniform depth, place remaining pointing mortar in 3 layers with each of first and second layers filling approximately 2/5 of joint depth and third layer the remaining 1/5. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have rounded edges recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry surfaces, or to featheredge mortar.

When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.

Cure mortar by maintaining in a damp condition for not less than 72 hours.

Where repointing work precedes cleaning of existing masonry allow mortar to harden not less than 30 days before beginning cleaning work.

FINAL CLEANING

After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, spray applied at low pressure.

Use of metal scrapers or brushes will not be permitted.

Use of acid or alkali cleaning agents will not be permitted.

END OF SECTION 04500

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.

Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.

Miscellaneous Metal Fabrications are specified elsewhere in Division 5.

Refer to Division 3 for anchor bolt installation in concrete; Division 4 for masonry.

Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

Promptly remove and replace materials or fabricated components which do not comply.

Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

SUBMITTALS

Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.

High-strength bolts (each type), including nuts and washers.

Structural steel primer paint.

Shrinkage-resistant grout.

Shop Drawings: Submit shop drawings prepared under supervision of a registered professional engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures and diagrams.

Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, and show size, length, and type of each weld.

Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of this section.

Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.

QUALITY ASSURANCE

Codes and Standards: Comply with provisions of following, except as otherwise indicated:

AISC "Code of Standard Practice for Steel Buildings and Bridges".

Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings".

AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including the "Commentary" and Supplements thereto as issued.

AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.

American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".

ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

If recertification of welders is required, retesting will be Contractor's responsibility.

DELIVERY, STORAGE AND HANDLING

Deliver materials to side at such intervals to insure uninterrupted progress of work.

Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

MATERIALS

Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

Structural Steel Shapes, Plates and Bars: ASTM A 36.

Hot-Formed Steel Tubing: ASTM A 501.

Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.

Finish: Black, except where indicated to be galvanized.

Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.

Anchor Bolts: ASTM A 307, nonheaded type unless otherwise indicated.

Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.

Provide hexagonal heads and nuts for all connections.

High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A 325.

Direct tension indicator washers may be used at Contractor's option.

Electrodes for Welding: Comply with AWS Code.

Structural Steel Primer Paint: Red lead-iron oxide, oil alkyd; TT-P-86, Type II.

Metallic Shrinkage-Resistant Grout: Pre-mixed factory-packaged ferrous aggregate grouting compound.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Firmix; Euclid Chemical Co.
Embeco 153; Master Builders.
Ferrolith G; Sonneborn/Contech.
Irontox; Toch Brothers.
Kemox C; Sika Chemical.
Vibra-Foil; W. R. Grace.

Non-metallic Shrinkage-Resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CE-CRD-C621.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Euco N.S.; Euclid Chemical Co.
Crystex; L&M Construction Chemicals
Masterflow 713; Master Builders
Five Star Grout; U.S. Grout Corp.
Upcon; Upco Chem. Div., USM Corp.
Propak; Protex Industries, Inc.
Set Non-Shrink; Set Products, Inc.

FABRICATION

Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

Connections: Weld shop connections, as indicated.

Bolt field connections, except where welded connections or other connections are indicated.

Provide high-strength threaded fasteners for all bolted connections, except where unfinished bolts are indicated.

High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" (RCRBSJ).

Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

Steel Wall Framing: Select members which are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square and true members in completed wall framing.

Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.

Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

SHOP PAINTING

General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.

Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.

Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:

SP-3 "Power Tool Cleaning".

Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces.

PART 3 - EXECUTION

ERECTION

Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

For proprietary grout materials, comply with manufacturer's instructions.

Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

Level and plumb individual members of structure within specified AISC tolerances.

Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

Splice members only where indicated and accepted on shop drawings.

Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.

Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

QUALITY CONTROL

Engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

Shop Bolted Connections: Inspect or test in accordance with AISC specifications.

Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

Perform visual inspection of all welds.

Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.

Field Bolted Connections: Inspect in accordance with AISC specifications.

Field Welding: Inspect and test during erection of structural steel as follows:

Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

Perform visual inspection of all welds.

Perform tests of welds as follows:

END OF SECTION 05120

SECTION 05210 - STEEL JOISTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

SUMMARY

Extent of steel joists is shown on drawings, including basic layout and type of joists required.

SUBMITTALS

Product Data: Submit manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI "Specifications".

Shop Drawings: Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include mark, number, type, location and spacing of joists and bridging.

Provide templates or location drawings for installation of anchor bolts and metal bearing plates.

QUALITY ASSURANCE

Provide joists fabricated in compliance with the following, and as herein specified.

Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables for:

K-Series Open Web Steel Joists

Qualification of Field Welding: Qualify welding processes and welding operators in accordance with the American Welding Society "Structural Welding Code," AWS D1.1.

Inspection: Inspect joists and girders in accordance with SJI specifications.

DELIVERY, STORAGE AND HANDLING

Deliver, store and handle steel joists as recommended in SJI "Specifications". Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS

MATERIALS

Steel: Comply with SJI "Specifications".

Steel Prime Paint: Comply with SJI "Specifications".

Bedding Mortar: For joist ends bearing on concrete or masonry, provide bedding mortar as follows:

Metallic shrinkage-resistant mortar; commercial, premixed material.

Products offered by manufacturers to comply with requirements include the following:

Embeco 153; Master Builders
Ferrolith-G; Sonneborn Contech.
Irontox; Toch Brothers.
Kemox C; Sika Chemical.
Vibra-Foil; W. R. Grace.

Non-metallic shrinkage-resistant mortar; premixed, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-C621.

Products offered by manufacturers to comply with requirements for non-metallic, non-shrink mortar include following:

Euco N.S.; Euclid Chemical Co.
Crystex; L&M Construction Chemicals
Masterflow 713; Master Builders
Five Star Grout; U.S. Grout Corp.
Upcon; Upco Chem. Div., USM Corp.
Propak; Protex Industries, Inc.

FABRICATION

General: Fabricate steel joists in accordance with SJI "Specification".

Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

Extended Ends: Provide extended ends on joists where shown, complying with manufacturer's standards and requirements of applicable SJI "Specifications" and load tables.

Ceiling Extensions: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1/2" of finished wall surface unless otherwise indicated.

Bridging: Provide horizontal or diagonal type bridging for joists, complying with SJI "Specifications".

Provide bridging anchors for ends of bridging lines terminating at walls or beams.

End Anchorage: Provide end anchorages including bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications", unless otherwise indicated.

Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

Apply one shop coat of steel prime paint to joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

ERECTION

Place and secure steel joists in accordance with SJI "Specifications", final shop drawings, and as herein specified.

Anchors: Furnish anchor bolts, bearing plates, and other devices to be built into concrete and masonry construction.

Refer to Division-3 sections for installation of anchors set in concrete.

Refer to Division-4 sections for installation of anchors set in masonry.

Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

> Where "open web" joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

Fastening Joists:

Field weld joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.

Secure joists resting on masonry or concrete bearing surfaces by bedding in mortar and anchoring to masonry or concrete construction as specified in SJI "Specifications" for type of steel joist used.

Touch-Up Painting: After joist installation, paint field bolt heads and nuts, and welded areas, abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same type of paint as used for shop painting.

END OF SECTION 05210

SECTION 05300 - METAL DECKING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

SUMMARY

Extent of metal decking is indicated on drawings, including basic layout and type of deck units required.

SUBMITTALS

Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.

Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details. and conditions requiring closure panels. supplementary framing. sump pans, cant strips, cut openings, special jointing or other accessories.

QUALITY ASSURANCE

Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated or specified:

AISI "Specification for the Design of Cold-Formed Steel Structural Members".

AWS D1.3 "Structural Welding Code - Sheet Steel".

SDI "Design Manual for Floor Decks and Roof Decks".

Qualification of Field Welding: Qualify welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS D1.1.

Welded decking in place is subject to inspection and testing. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if welds are found to be satisfactory. Expense of removing and replacing portions of decking found to be defective will be borne by the Contractor.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Metal Roof Deck Units:

Bowman/E.G. Smith, Div. Cyclops Corp.
Consolidated Systems, Inc.
Epic Metals Corp.
Mac-Fab Products, Inc.
Roll Form Products, Inc.
United Steel Deck, Inc.
Vulcraft/Div. Nucor Corp.
United Steel Deck, Inc.
Wheeling Corrugating Co.
Wolverine Deck Co.

MATERIALS

Steel for Painted Metal Deck Units: ASTM A 611, Grade C.

Steel for Galvanized Metal Deck Units: ASTM A 446, Grade A.

Miscellaneous Steel Shapes: ASTM A 36.

Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

Galvanizing: ASTM A 525, G60.

Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).

Paint: Manufacturer's baked-on, rust-inhibitive paint, for application to metal surfaces which have been chemically cleaned and phosphate chemical treated.

Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

FABRICATION

General: Form deck units in lengths to span 3 or more supports, with flush, telescoped or nested 2" laps at ends and interlocking or nested side laps, unless otherwise indicated.

Open-Beam Metal Floor Deck Units: Provide fluted sections of metal thickness, depth and width as shown.

PART 3 - EXECUTION

INSTALLATION

General: Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.

Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.

Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

Do not place deck units on concrete supporting structure until concrete has cured and is dry.

Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

Do not use floor deck units for storage or working platforms until permanently secured.

Fastening Deck Units:

Fasten floor deck units to steel supporting members by not less than 3/4" diameter fusion welds or elongated welds of equal strength, spaced not more than 12" o.c. with a minimum of 2 welds per unit at each support.

Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

Use welding washers recommended by deck manufacturer.

Mechanically fasten side laps of adjacent deck units between supports, at intervals not exceeding 36" o.c., using self-tapping No. 8 or larger machine screws.

Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

Hanger Slots or Clips: Provide UL approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.

Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.

Locate slots or clips at not more than 14" o.c. in both directions, not over 9" from walls at ends, and not more than 12" from walls at sides, unless otherwise shown.

Provide manufacturer's standard hanger attachment devices.

Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.

Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

Touch-Up Painting: After decking installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

END OF SECTION 05300

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

SUMMARY

This section includes the following metal fabrications:

- Rough hardware.
- Loose bearing and leveling plates.
- Loose steel lintels.
- Miscellaneous framing and supports for the following:
  - Overhead doors.
  - Suspended operable partitions.
  - Applications where framing and supports are not specified in other sections.
- Miscellaneous steel trim.
- Shelf and relieving angles.
- Structural steel door frames for overhead doors.
- Steel pipe railings.
- Metal stairs.

Related Sections: The following sections contain requirements that relate to this section:

- Division 5 Section "Structural Steel" for structural steel framing system components.

Division 5 Section "Handrails and Railings" for the following:

Ornamental metal handrails and railing systems.

DEFINITIONS

Definitions in ASTM E 985 for railing-related terms apply to this section.

SYSTEM PERFORMANCE REQUIREMENTS

Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.

Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

Concentrated load of 300 lb applied at any point nonconcurrently, vertically downward, or horizontally.

Uniform load of 100 lb per linear ft. applied nonconcurrently, vertically downward or horizontally.

Concentrated and uniform loads above need not be assumed to act concurrently.

Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

Concentrated load of 200 lb applied at any point nonconcurrently, vertically downward or horizontally.

Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 lb applied to one sq. ft. at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.

Above load need not be assumed to act concurrently with uniform horizontal loads on top rails of railing systems in determining stress on guard.

Treads of Steel Stairs: Capable of withstanding a uniform load of 100 lb per sq. ft. or a concentrated load of 300 lb on a area of 4 sq. inches located in the center of the tread, whichever produces the greater stress.

Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 lb per sq. ft.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data for products used in miscellaneous metal fabrications, including paint products and grout.

Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

Where installed metal fabrications are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by the qualified professional engineer who was responsible for their preparation.

Samples representative of materials and finished products as may be requested by Architect.

Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.

Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project name, addresses, names of Architects and Owners, and other information specified.

QUALITY ASSURANCE

Fabricator Qualifications: Firms experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

Installer Qualifications: Arrange for installation of metal fabrications specified in this section by same firm that fabricated them.

Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel", and D1.2 "Structural Welding Code - Aluminum."

Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

Engineer Qualifications: Professional engineer licensed to practice in Massachusetts and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this Project.

PROJECT CONDITIONS

Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

SEQUENCING AND SCHEDULING

Sequence and coordinate installation of wall handrails as follows:

Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

Mount handrails only on gypsum board assemblies reinforced to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of Installer.

PART 2 - PRODUCTS

FERROUS METALS

Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

Steel Plates, Shapes, and Bars: ASTM A 36.

Rolled Steel Floor Plates: ASTM A 786.

Steel Bars for Gratings: ASTM A 569 or ASTM A 36.

Wire Rod for Grating Cross Bars: ASTM A 510.

Steel Tubing: Product type (manufacturing method) and as follows:

Cold-Formed Steel Tubing: ASTM A 500, grade as indicated below:

Grade A, unless otherwise indicated or required for design loading.

Uncoated Structural Steel Sheet: Product type (manufacturing method), quality, and grade, as follows:

Cold-Rolled Structural Steel Sheet: ASTM A 611, grade as follows:

Grade A, unless otherwise indicated or required by design loading.

Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:

Cold-Rolled Steel Sheet: ASTM A 366.

Galvanized Steel Sheet: Quality as follows:

Structural Quality: ASTM A 446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.

Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

Black finish, unless otherwise indicated.

Galvanized finish for exterior installations and where indicated.

Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

Gray Iron Castings: ASTM A 48, Class 30.

Malleable Iron Castings: ASTM A 47, grade 32510.

Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

GROUT AND ANCHORING CEMENT

Nonshrink Metallic Grout: Premixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C 621, specifically recommended by manufacturer for heavy duty loading applications of type specified in this section. Use only where indicated and locations not exposed to moisture.

Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include but are not limited to the following:

Nonshrink Metallic Grouts:

"Metox RM"; Chem-Masters Corp.
"Hi Mod Grout"; Euclid Chemical Co.
"Embeco 885 and 636"; Master Builders.
"Ferrolith G Redi-Mix and G-NC"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
"Stonecrete MG1"; Stonhard, Inc.

Nonshrink Nonmetallic Grouts:

"Bonsal Construction Grout"; W.R. Bonsal Co.
"Diamond-Crete Grout"; Concrete Service Materials Co.
"Euco N-S Grout"; Euclid Chemical Co.
"Kemset"; Chem-Masters Corp.
"Crystex"; L & M Construction Chemicals, Inc.
"Masterflow 713"; Master Builders.
"Sealtight 588 Grout"; W.R. Meadows, Inc.
"Sonogrout"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
"Stoncrete NM1"; Stonhard, Inc.
"Five Star Grout"; U.S. Grout Corp.
"Vibropruf #11"; Lambert Corp.

Interior Anchoring Cement:

"Bonsal Anchor Cement"; W.R. Bonsal Co.
"Por-Rok"; Minwax Construction Products Division.

Erosion-Resistant Anchoring Cement:

"Super Por-Rok"; Minwax Construction Products Division.

FASTENERS

General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

Lag Bolts: Square head type, FS FF-B-561.

Machine Screws: Cadmium plated steel, FS FF-S-92.

Wood Screws: Flat head carbon steel, FS FF-S-111.

Plain Washers: Round, carbon steel, FS FF-W-92.

Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.

Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.

Lock Washers: Helical spring type carbon steel, FS FF-W-84.

PAINT

Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20.

Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

FABRICATION, GENERAL

Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

Temperature Change (Range): 100 deg F (55.5 deg C).

Shear and punch metals cleanly and accurately. Remove burrs.

Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Remove sharp or rough areas on exposed traffic surfaces.

Weld corners and seams continuously to comply with AWS recommendations and the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

ROUGH HARDWARE

Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

LOOSE BEARING AND LEVELING PLATES

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

LOOSE STEEL LINTELS

Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

Weld adjoining members together to form a single unit where indicated.

Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

Galvanize loose steel lintels located in exterior walls.

MISCELLANEOUS FRAMING AND SUPPORTS

General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide x 1/4 inches x 8 inches long.

Galvanize miscellaneous framing and supports in the following locations:

Exterior locations.

Interior locations where indicated.

MISCELLANEOUS STEEL TRIM

Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

Galvanize miscellaneous framing and supports in the following locations:

Exterior locations.

Interior locations where indicated.

SHELF AND RELIEVING ANGLES

Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4 inch bolts, spaced not more than 6 inches from ends and not more than 24 inches o.c., unless otherwise indicated.

For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated expansion joints in cavity wall exterior wythe.

Galvanize shelf angles to be installed on exterior concrete framing.

STRUCTURAL STEEL DOOR FRAMES FOR OVERHEAD DOORS

Fabricate steel door frames from structural shapes and bars of size and to dimensions indicated, fully welded together, with 5/8 inch x 1-1/2 inch steel bar stops, unless otherwise indicated. Plug weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches o.c. Reinforce frames and drill and tap as required to accept finish hardware.

Provide steel strap anchors for securing door frames into adjoining concrete or masonry, using 1/8 inch x 2 inch straps of the length required for a minimum 8 inch embedment, unless otherwise indicated. Weld anchors to frame jambs no more than 12 inches from both bottom and head of frame and space anchors not more than 30 inches apart.

Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

Galvanize frames and anchors in the following locations:

Exterior locations.

STEEL PIPE RAILINGS AND HANDRAILS

General: Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.

Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.

Form changes in direction of railing members as follows:

By mitering at elbow bends.

By bending.

By any method indicated above, applicable to change of direction involved.

Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.

Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4 inches high x 1/8 inch steel plate welded to, and centered between, each railing post.

Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

For railing posts set in concrete fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2 inch below finished surface of concrete.

For removable railing posts, fabricate slip-fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgement.

Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

For exterior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

For interior steel railings formed from steel pipe with black finish, provide nongalvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

STEEL FRAMED STAIRS

General: Construct stairs to conform to sizes and arrangements indicated. Join pieces together by welding, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.

NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual" for class of stair designated, except where more stringent requirements are indicated:

Commercial class, unless otherwise indicated.

Architectural class where indicated.

Stair Framing: Fabricate stringers of structural steel channels, or plates, or a combination thereof, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to strings, newels, and framing members to strings and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces.

Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated, but not less than that required, to support total design loading.

Form metal pans of uncoated cold-rolled steel sheet, unless otherwise indicated.

Attach risers and subtreads to stringers by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding.

At Contractor's option, provide prefabricated stair assemblies with prefilled treads consisting of prepoured reinforced concrete fill, with non-slip aggregate finish, in welded sheet metal pan, attached to installed stringers using manufacturer's standard connection detail.

Product: Subject to compliance with requirements, provide Speedstair by American Stair Corp., Inc.

Provide subplatforms of configuration and construction indicated; if not indicated, of same metal as risers and subtreads, in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

Stair Railings and Handrails: Comply with applicable requirements specified elsewhere in this section for steel pipe railings and handrails, and as follows:

Fabricate newels of steel tubing and provide newel caps of gray-iron castings, as shown.

Railings may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.

Connect railing posts to stair framing by direct welding, unless otherwise indicated.

FINISHES, GENERAL

Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

Finish metal fabrications after assembly.

STEEL AND IRON FINISHES

Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:

ASTM A 153 for galvanizing iron and steel hardware.

ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning."

Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry,

unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

PART 3 - EXECUTION

PREPARATION

Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

INSTALLATION, GENERAL

Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

SETTING LOOSE PLATES

Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

Use metallic nonshrink grout in concealed locations where not exposed to moisture; use nonmetallic nonshrink grout in exposed locations, unless otherwise indicated.

Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

INSTALLATION OF STEEL PIPE RAILINGS AND HANDRAILS

Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

Anchor posts in concrete by core drilling holes not less than 5 inches deep and 3/4 inch greater than outside diameter of post. Clean holes of all loose material, insert posts and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

Nonshrink, nonmetallic grout or anchoring cement.

Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch build-up, sloped away from post. For installations exposed on exterior, or to flow of water, seal anchoring material to comply with grout manufacturer's directions.

Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.

Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.

Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.

Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:

Use type of bracket with pre-drilled hole for exposed bolt anchorage.

For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.

For hollow masonry anchorage, use toggle bolts having square heads.

For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

ADJUSTING AND CLEANING

Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05500

SECTION 05520 - HANDRAILS AND RAILINGS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of handrails and railings is indicated on drawings and includes miscellaneous handrails and railing systems not included in other sections of these specifications.

Types of handrails and railing systems required in this section include:

Aluminum handrails and railing systems.

Steel pipe handrails and railing systems are specified in another Division-5 section, "Metal Fabrications".

Products furnished but not installed under this section include inserts and anchors preset in masonry and concrete for anchorage of handrails and railing systems.

DEFINITIONS

Definitions in ASTM E 985 for railing-related terms apply to this section.

SYSTEM DESCRIPTION

Structural Performances of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.

Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.

Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

Concentrated load of 300 lbf applied at any point nonconcurrently, vertically downward or horizontally.

Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

Concentrated load of 200 lbf applied at any point nonconcurrently, vertically downward or horizontally.

Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 lbf applied to one sq. ft. at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.

Above load need not be assumed to act concurrently with uniform horizontal loads on top rails of railing systems in determining stress on guard.

SUBMITTALS

Product Data: Manufacturer's technical data for products and processes used in handrails and railing systems, including finishes and grout.

Shop Drawings: Show details of fabrication and installation for each type and material of handrail and railing system required including plans, elevations, sections, profiles of rails, fittings, connections, and anchors.

Provide templates for anchor and bolt installation by others.

Include structural computations evidencing compliance of handrails and railing systems with design loadings indicated.

Test reports from independent testing laboratory evidencing compliance of handrails and railing systems with ASTM E 985.

QUALITY ASSURANCE

Single Source Responsibility: Obtain handrails and railing systems of each type and material from a single manufacturer.

Design Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of structural computations for handrails and railing systems to determine compliance with structural performance requirements indicated.

Engineer Qualifications: A professional engineer who is licensed to practice in jurisdiction where Project is located and who is experienced in providing structural engineering services of the kind required for work of this section.

STORAGE

Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage of any kind. Cover with waterproof paper, tarpaulin, or polyethylene sheeting; allow for air circulation inside the covering.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering handrails and railing systems which may be incorporated in the work include, but are not limited to, the following:

Manufacturer: Subject to compliance with requirements, provide handrails and railing systems of one of the following:

Aluminum Pipe Railing System Manufacturers:

Aluminum Tube Railings, Inc.
Architectural Art Mfg., Inc.
Blum: Julius Blum & Co., Inc.
Blumcraft of Pittsburgh.
Braun: J.G. Braun Co.
Craneveyor Corp.
Lifeguard Corp.
Newman Bros., Inc.
Potts Mfg. Div., Flight Systems.
Sterling Factories, Inc.
Superior Aluminum Products, Inc.
Tri-Tech Inc.
TSCO International, Tube Specialties Co., Inc.
Wagner: R & B Wagner, Inc.
York Metal Fabricators, Inc.

METALS

General: Comply with standards indicated for forms and types of metals indicated or required for handrail and railing system components.

Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.

Extruded Bar and Shape: ASTM B 221, 6063-T6.

Extruded Pipe and Tube: ASTM B 429, 6063-T6.

Drawn Seamless Tube: ASTM B 483, 6063-T832.

Plate and Sheet: ASTM B 209, 6061-T6.

Die and Hand Forgings: ASTM B 247, 6061-T6.

Castings: ASTM B 26, 356-T6.

MISCELLANEOUS MATERIALS

Nonshrink Nonmetallic Grout: Pre-mixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

Fasteners: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals which are corrosive or incompatible with materials joined.

Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.

Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

Anchors and Inserts: Provide anchors of type, size, and material required for type of loading and installation condition shown, as recommended by manufacturer, unless otherwise indicated. Use non-ferrous metal of hot-dipped galvanized anchors and inserts for exterior locations and elsewhere as required for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

FABRICATION

General: Fabricate handrails and railing systems to design, dimensions and details shown. Provide handrail and railing members in sizes and profiles indicated, with supporting posts and brackets of size and spacing shown, but not less than required to comply with requirements indicated for structural performance.

Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

Nonwelded Connections: Fabricate railing systems and handrails for interconnection of members by means of railing manufacturer's standard concealed mechanical fasteners and fittings unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.

Welded Connections for Aluminum Pipe: Fabricate aluminum pipe handrails and railing systems for interconnection of members by concealed internal welds, which eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

Form changes in direction of railing members by bending members, insertion of prefabricated elbow fittings, radius bends, or by mitering.

At elbow bends provide mitered joints.

For handrails and railing systems with nonwelded connections which are exposed to exterior or to moisture from condensation or other sources, provide weepholes or other means for evacuation of entrapped water in hollow sections of railing members.

Brackets, Flanges, Fittings and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings and anchors for interconnection of handrail and railing members to other work, unless otherwise indicated.

Furnish inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work. Fabricate anchorage devices which are capable of withstanding loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.

For railing posts set in concrete provide preset sleeves of steel, not less than 6" long and inside dimensions not less than 1/2" greater than outside dimensions of post, with steel plate forming bottom closure.

METAL FINISHES, GENERAL

Comply with NAAMM "Metal Finishes Manual" for recommendations and designations of finishes, except as otherwise indicated.

ALUMINUM FINISHES

Class I Color Anodized Finish: AA-M12C22A42/44 (mechanical finish, nonspecular as fabricated; chemical etch, medium matte; 0.7 mil min. thick electrolytically deposited or integrally colored anodic coating) complying with AAMA 606.1 or AAMA 608.1.

Color: As selected by Architect from within standard industry colors and color density range.

PART 3 - EXECUTION

PREPARATION

Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete as masonry construction. Coordinate delivery of such items to project site.

Field Measurements: Take field measurements prior to fabrication.

INSTALLATION, GENERAL

Fit exposed connections accurately together to form tight, hairline joints.

Perform cutting, drilling and fitting required for installation of handrails and railing systems. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Do not weld, cut or abrade surfaces of handrails and railing components which have been coated or finished after fabrication, and are intended for field connection by mechanical means without further cutting or fitting.

Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at intervals indicated but not less than that required by design loadings.

ANCHORING POSTS

Concrete-Anchored Posts in Sleeves: Insert posts in preset sleeves cast into concrete and fill annular space between posts and sleeve solid with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.

Cover anchorage joint with flange or escutcheon plate attached to post after filling of annular space.

Anchor posts to metal surfaces with manufacturer's standard fittings designed for this purpose, unless otherwise indicated.

RAILING CONNECTIONS

Nonwelded Connections: Use manufacturer's standard mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to

prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic filler cement colored to match finish of handrails and railing systems.

Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.

ANCHORING RAILING ENDS

Anchor railing ends into concrete or masonry with manufacturer's standard fittings designed for this purpose, unless otherwise indicated.

Anchor railing ends to metal surfaces with manufacturer's standard fittings using concealed fasteners, unless otherwise indicated.

ATTACHMENT OF HANDRAILS TO WALLS

General: Secure handrails to walls with manufacturer's standard wall brackets and end fittings, unless otherwise indicated.

For concrete and solid masonry, use drilled-in expansion shields and concealed hanger bolts, unless otherwise indicated.

For hollow masonry anchorage, use toggle bolts with square heads, unless otherwise indicated.

For stud partitions use lag bolts fastened to wood blocking between studs. Coordinate with spacing of studs for accurate location of blocking members.

ADJUSTING

PROTECTION

Protect finishes of railing systems and handrails from damage during construction period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.

Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units as required.

END OF SECTION 05520

SECTION 05715 - PREFABRICATED SPIRAL STAIRS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Definition: Prefabricated spiral stairs consist of assemblies of spirally-arranged triangular shaped treads radiating from a central supporting column, and include platforms and railings.

Steel framed stairs not of spiral design are specified in Division 5 section, "Metal Fabrications."

SYSTEM PERFORMANCES

Structural Performances: Provide spiral stair assemblies which, when installed, comply with the following minimum requirements for structural performance, unless otherwise indicated.

Treads: Capable of withstanding a uniform load of 100 lbf per sq. ft. or a concentrated load of 300 lbf so located as to produce maximum stress conditions.

Handrails and Top Rails: Capable of withstanding a concentrated load of 200 lbf applied at any point, downward or horizontally.

Guards: Balusters capable of withstanding a uniform load of 25 lbf per sq. ft. of gross area of the guard, including any open areas, of which balusters are a part.

QUALITY ASSURANCE

Shop Assembly: Preassemble and inspect stair units in factory to ensure coordinated, well-fitted assemblies, disassemble for shipping and handling after clearing marking components to permit coordinated assembly.

SUBMITTALS

Product Data: Submit manufacturer's specifications and installation instructions for prefabricated stair units including paint products.

Shop Drawings: Submit shop drawings for fabrication and erection of prefabricated metal stairs. Include plans, elevations, sections and details of components and at connections. Provide templates for anchor and bolt installation by others.

Where materials or assemblies are indicated to comply with certain design loading requirements, include structural computations, material properties and other information needed for structural analysis.

Samples: Submit samples of stair components including exposed metal with painted finish, tread wearing surface, and railing members.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Accent Spiral Stairway Div., Woodbridge Ornamental Iron Co.
Boston Design Corp.
Duvinage Corporation

MATERIALS

Metals:

Metal Surfaces, General: For fabrication of prefabricated spiral stairs use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

Steel Plates, Shapes and Bars: ASTM A 36.

Steel Bar for Grating Treads and Platforms: ASTM A 569.

Steel Columns: ASTM A 513.

Steel Pipe Railings: ASTM A 53, standard weight (schedule 40), black finish unless galvanizing indicated.

Gray Iron Castings: ASTM A 48, Class 30.

Miscellaneous Materials:

Shop Primer for Steel: Manufacturer's standard.

Fasteners: Of size and type standard with manufacturer; of same metal as fastened metal, except use stainless steel for fastening of aluminum components.

Galvanized Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, complying with Military Specifications, MIL-P-21035 (Ships).

FABRICATION

Workmanship, General:

Use materials of size and thickness indicated, or if not otherwise indicated, as required to produce assemblies of proper strength and durability for intended use. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support.

Form exposed work true to line and level with accurate angles and surfaces and edges straight and curved as indicated. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Weld corners and seams continuously, complying with AWS specification for filler metals, electrodes and procedures. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners supplied by stair manufacturer only for field-made connections, unless otherwise indicated.

Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support.

Fabrication of Components:

Steel Column for Center Support: Provide steel column with base plate of size and type required to support loads and provide for anchorage to floor structure; provide suitable anchorage of column at upper floors by means of landings attached to column and floor structure, unless otherwise indicated. Provide cap for column if top exposed.

Stair Treads and Platforms: Fabricate treads and landings to conform to sizes and arrangement indicated with hubs machined to proper tolerances for coordinated field assembly and attachment to columns. Provide treads and platforms of material, frame type, and wearing surface below:

Bent Steel plate treads and platforms with non-tapering flanges, welded hubs and legs; wearing surface as indicated below:

Checkered plate.

Risers: Provide closed risers of manufacturer's standard design.

Railings: Provide manufacturer's standard railing systems uniformly bent to spiral shape and continuing at top to form guard rail around floor opening. Provide balusters and handrails of size, material and design indicated.

METAL FINISHES

General: Comply with NAAMM "Metal Finishes Manual" for recommendations and designations of finishes, except as otherwise indicated.

Ferrous Metal Paint Finish:

Preparation: Clean surfaces of dirt, grease and loose rust or mill scale, including items with galvanized coating, if any. Pretreat galvanized surfaces to be painted, with conversion coating of type suited to organic coating applied over it.

Factory-prime finish: Apply air-dried primer immediately following cleaning and pretreatment, if any, to surfaces which will be exposed and to non-galvanized surfaces which will be concealed, to provide a minimum dry film thickness of 2.0 mils.

PART 3 - EXECUTION

PREPARATION

Furnish setting drawings, diagrams, templates, and directions for installation of anchorages including concrete inserts, anchor bolts and miscellaneous items with integral anchors which are to be embedded in concrete construction.

INSTALLATION

Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction, including threaded fasteners, concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.

Assembly and Placement: Assemble spiral stair components to comply with manufacturer's instructions with each component aligned and in proper relationship to each other, securely anchored to supporting column and adjacent structure. Set stairs accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Do not cut, alter or drill any stair components in field which do not fit properly but return to manufacturer for refabrication, unless otherwise indicated. Do not weld connections which are intended to be bolted or screwed.

Welding: At connections between stairs and building structure which are indicated to be connected by welding, comply with AWS Specifications for materials and procedures

for manual shielded metal-arc welding, the appearance and quality of welds made, and methods used in correcting welding work.

ADJUST AND CLEAN

Touch-up Painting: Immediately after erection, clean field welds, bolted connections and abraded areas of factory-painted surfaces, and paint those areas where paint has been removed with same material used in factory painting. Apply by brush and spray to provide a minimum dry thickness of 2.0 mils.

END OF SECTION 05715

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Types of work in this section include rough carpentry for:

Miscellaneous wood framing.

Wood grounds, nailers and blocking.

Wood furring.

Underlayment.

Plywood roof decking.

Finish carpentry is specified in another section within Division 6.

Pre-fabricated wood trusses are specified in another Division-6 section.

DEFINITIONS

Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated.

SUBMITTALS

Product Data: Submit manufacturer's specifications and installation instructions for materials listed below:

Roof sheathing.

Material Certificates: Where dimensional lumber is provided to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in form of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.

Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material.

Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and conformance with applicable standards.

For water-borne treatment, include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

Fire-Retardant Treatment: Include certification by treating plant that treated material complies with specified standard and other requirements.

PRODUCT HANDLING

Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

For lumber and plywood pressure treated with waterborne chemicals, sticker between each course to provide air circulation.

PROJECT CONDITIONS

Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other work.

PART 2 - PRODUCTS

LUMBER, GENERAL

Lumber Standards: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

Inspection Agencies: Inspection agencies and the abbreviations used to reference with lumber grades and species include the following:

RIS - Redwood Inspection Service.
NLGA - National Lumber Grades Authority (Canadian).
SPIB - Southern Pine Inspection Bureau.
WCLIB - West Coast Lumber Inspection Bureau.

WWPA - Western Wood Products Association.

Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

Provide dressed lumber, S4S, unless otherwise indicated.

Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

MISCELLANEOUS LUMBER

Provide wood for support or attachment of other work including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, and as follows:

Moisture content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

Grade: Standard Grade light framing size lumber of any species or board size lumber as required. No. 3 Common or Standard grade boards per WCLIB or WWPA rules or No. 3 boards per SPIB rules.

CONSTRUCTION PANELS

Construction Panel Standards: Comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood panels and, for products not manufactured under PS 1 provisions, with American Plywood Associates (APA) "Performance Standard and Policies for Structural-Use Panels", Form No. E445.

Trademark: Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements.

Concealed APA Performance-Rated Panels: Where construction panels will be used for the following concealed types of applications, provide APA Performance-Rated Panels complying with requirements indicated for grade designation, span rating, exposure durability classification, edge detail (where applicable) and thickness.

Roof Sheathing: APA RATED SHEATHING.

Exposure Durability Classification: EXTERIOR.

Span Rating: 40/20.

All roof sheathing shall be fire-retardant treated in accordance with American Wood Preservers Association Standard AWPA C27, and each piece shall bear a UL label, shall be APA rated sheathing marked PS1. After treatment plywood shall be dried to an average moisture content of 15 percent (15%).

Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA C-D PLUGGED INT with exterior glue, in thickness indicated, or, if not otherwise indicated, not less than 15/32".

MISCELLANEOUS MATERIALS

Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A 153).

All roof deck fasteners shall be hot-dip zinc coating (ASTM A 153).

Building Paper: ASTM D 226, Type I; asphalt saturated felt, non-perforated, 15-lb. type.

Air Infiltration Barrier: Provide 6.1 mil thick fabric composed of very fine, high density polyethylene fibers with vapor transmission rate of 51.30 grams per 100 sq. in. in 24 hours; weight of 8.81 lbs. per 1000 sq. ft.; bursting strength of 105 psi; tear resistance of 32.5 lbs. for length, 24.8 lbs. for width; air porosity of 7.6 seconds; water resistance of 99.3 cm of water head.

Product: Subject to compliance with requirements, provide Tyvek; Textile Fibers Dept., DuPont Co.

WOOD TREATMENT BY PRESSURE PROCESS:

Preservative Treatment: Where lumber or plywood is indicated as "Trt-Wd" or "Treated," or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

Pressure-treat above-ground items with water-borne preservatives to comply with AWPB LP-2. After treatment, kiln-dry lumber and plywood to a maximum

moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

Wood framing members less than 18" above grade.

Wood floor plates installed over concrete slabs directly in contact with earth.

Fire-Retardant Treatment: Where fire-retardant treated wood ("FRTW") is indicated, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 and C27, respectively, for treatment type indicated below; identify "FRTW" lumber with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.

Interior Type A: Use where "FRTW" wood is indicated for interior applications.

Exterior Type: Use where "FRTW" wood is indicated for exterior, exposed applications.

Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

INSTALLATION, GENERAL

Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.

Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.

Countersink nail heads on exposed carpentry work and fill holes.

Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

WOOD GROUNDS, NAILERS, BLOCKING AND SLEEPERS

Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

Provide permanent grounds of dressed, preservative treated, key-bevelled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

WOOD FURRING

Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.

Firestop furred spaces on walls at each floor level and at ceiling line of top story, with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

Furring to Receive Gypsum Drywall: Unless otherwise indicated, provide 1" x 2" furring at 16" o.c., vertically.

INSTALLATION OF CONSTRUCTION PANELS

General: Comply with applicable recommendations contained in Form No. E 30F, "APA Design/Construction Guide - Residential & Commercial," for types of plywood products and applications indicated.

Fastening Methods: Fasten panels as indicated below:

Roof sheathing: Nail to framing.

Plywood Backing Panels: Nail to supports.

AIR INFILTRATION BARRIER:

Cover wall sheathing with air infiltration barrier to comply with manufacturer's printed directions.

END OF SECTION 06100

SECTION 06192 - PREFABRICATED WOOD TRUSSES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent and configuration of prefabricated wood trusses is indicated on drawings.

Types of prefabricated wood trusses include:

Gable-shaped trusses.

Roof sheathing is specified in Division-6 section "Rough Carpentry".

DEFINITIONS

Prefabricated wood trusses include planar structural units consisting of metal plate connected members which are fabricated from dimension lumber and which have been cut and assembled prior to delivery to the project site.

SUBMITTALS

Product Data: Submit fabricator's technical data covering lumber, metal plates, hardware, fabrication process, treatment (if any), handling and erection.

Submit certificate, signed by an officer of fabricating firm, indicating that trusses to be supplied for project comply with indicated requirements.

Submit certification by treating plant that required fire-retardant treatment complies with specified standard and other requirements, and by metal connector plate manufacturer that fire-retardant formulation is approved for use with plates for truss exposure indicated.

Shop Drawings: Submit shop drawings showing species, sizes and stress grades of lumber to be used; pitch, span, camber configuration and spacing for each type of truss required; type, size, material, finish, design values, location of metal connector plates; and bearing and anchorage details.

To the extent engineering design considerations are indicated as fabricator's responsibility, submit design analysis and test reports indicating loading, section modulus, assumed allowable stress, stress diagrams and calculations, and similar information needed for analysis and to ensure that trusses comply with requirements.

Provide shop drawings which have been signed and stamped by a structural engineer licensed to practice in the jurisdiction where trusses will be installed.

QUALITY ASSURANCE

TPI Standards: Comply with applicable requirements and recommendations of the following Truss Plate Institute (TPI) publications:

"Design Specification for Metal Plate Connected Wood Trusses".

"Commentary and Recommendations for Handling and Erecting Wood Trusses".

"Commentary and Recommendations for Bracing Wood Trusses".

"Quality Standard for Metal Plate Connected Wood Trusses".

Wood Structural Design Standard: Comply with applicable requirements of "National Design Specification for Wood Construction" published by N.F.P.A.

Design by Manufacturer: Trusses shall be designed by Connector-plate manufacturer to support all superimposed dead and live loads indicated, with design approved and certified by a structural engineer licensed to practice in the jurisdiction where trusses will be installed.

Connector Plate Manufacturer's Qualifications: Provide truss connector plates manufactured by a firm which is a member of TPI and which complies with TPI quality control procedures for manufacture of connector plates published in TPI "Quality Standard for Metal Plate Connected Wood Trusses".

Fabricator's Qualifications: Provide trusses by a firm which has a record of successfully fabricating trusses similar to type indicated and which complies with the following requirements for quality control:

Fabricator participates in TPI "Quality Assurance Inspection Program" as a licensee authorized to apply TPI marks to trusses.

DELIVERY, STORAGE, HANDLING

Handle and store trusses with care, and in accordance with manufacturer's instructions and TPI recommendations to avoid damage from bending, overturning or other cause for which truss is not designed to resist or endure.

Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying work of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal connector plates which may be incorporated in the work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide metal connector plates of one of the following:

Alpine Engineered Products, Inc.
Clary Corporation.
Gang Nail Systems, Inc.
Hydro-Air Engineering, Inc.
Inter-Lock Steel Co., Inc.
Link-Wood Construction Systems.
Lumbermate Company.
Robbins Manufacturing Co.
The Panel-Clip Company.
Tee-Lok Corp.
Truss Connectors of America.
Truswal Systems Corp.
Wood Fabricators, Inc.
Wood Structures, Inc.

LUMBER

Factory mark each piece of lumber with type, grade, mill and grading agency.

Lumber Standard: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

Inspection Agencies: Inspection agencies and the abbreviations used to reference them to lumber grades and species include the following:

NGLA - National Lumber Grades Authority (Canadian).
SPIB - Southern Pine Inspection Bureau.
WCLIB - West Coast Lumber Inspection Bureau.
WWPA - Western Wood Products Association.

Nominal sizes are indicated, except as shown by detail dimensions.

Provide lumber manufactured to actual sizes required by PS 20 to comply with requirements indicated below:

Dressed, S4S, unless otherwise indicated.

Moisture Content: Seasoned, with 19 percent maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

Species: Provide any species and grade which has been stress-rated and certified, at indicated moisture content, to comply with requirements below for method and for minimum design values of single members:

Stress-Rating Method: Machine stress-rated.

Design Values: As indicated on drawings.

METAL CONNECTOR PLATES, FASTENERS AND ANCHORAGES

Connector Plates: Fabricator connector plates from metal complying with the following requirements:

Hot-Dip Galvanized Steel Sheet: Structural (physical) quality steel sheet complying with ASTM A 446, Grade A; zinc coated by hot-dip process to comply with ASTM A 525, Designation G60; minimum coated metal thickness indicated but not less than 0.036".

Electrolytic Zinc-Coated Steel Sheet: Structural (physical) quality steel sheet complying with ASTM A 591, Coating Class C, and, for structural properties, with ASTM A 446, Grade A; zinc-coated by electro-deposition; with minimum coated metal thickness indicated but not less than 0.047".

Aluminum-Zinc Alloy-Coated Steel Sheet: Structural (physical) quality steel sheet complying with ASTM A 792, Coating Designation AZ 50, and, for structural properties, with ASTM A 446, Grade A; aluminum-zinc alloy-coated by hot-dip process; with minimum coated metal thickness indicated but not less than 0.036".

Stainless steel sheet complying with ASTM A 167 and, for structural properties, with ASTM A 446, Grade A; with minimum metal thickness indicated but not less than 0.035".

Any metal indicated above.

Fasteners and Anchorages: Provide size, type, material and finish indicated for nails, screws, bolts, nuts, washers and anchoring devices.

WOOD TREATMENT

Fire Retardant Treatment: Where fire-retardant treated wood ("FRTW") is required for trusses, pressure impregnate lumber with fire-retardant chemicals to comply with AWPA C20 for treatment type indicated below and identify treated material with appropriate classification marking of Underwriters Laboratory, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction. Use treatment type approved by metal connector plate manufacturer as being non-corrosive to metal connector plates for application indicated.

Interior Type A: Use where "FRTW" wood is indicated for interior applications.

Inspect each piece of treated lumber after drying and discard damaged or defective pieces.

FABRICATION

Cut truss members to accurate lengths, angles and sizes to produce close fitting joints with wood-to-wood bearing in assembled units.

Fabricate metal connector plates to size, configuration, thickness and anchorage details required for types of joint designs indicated.

Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with close fitting joints. Position members to produce design camber indicated.

Connect truss members by means of metal connector plates accurately located and securely fastened to each side of wood members by means indicated or approved.

PART 3 - EXECUTION

INSTALLATION

General: Erect and brace trusses to comply with recommendations of manufacturer and the Truss Plate Institute.

Erect trusses with plane of truss webs vertical (plumb) and parallel to each other, located accurately at design spacings indicated.

Hoist units in place by means of lifting equipment suited to sizes and types of trusses required, applied at designated lift points as recommended by fabricator, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

Provide temporary bracing as required to maintain trusses plumb, parallel and in location indicated, until permanent bracing is installed.

Anchor trusses securely at all bearing points to comply with methods and details indicated.

Install permanent bracing and related components to enable trusses to maintain design spacing, withstand live and dead loads including lateral loads, and to comply with other indicated requirements.

Do not cut or remove truss members.

END OF SECTION 06192

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Definition: Finish carpentry includes carpentry work which is exposed to view, is non-structural, and which is not specified as part of other sections.

Types of finish carpentry work in this section include:

Exterior running and standing trim.

Interior running and standing trim.

Plywood exterior siding.

Rough carpentry is specified in another Division-6 section.

Builders Hardware and wood doors are specified in Division-8 sections.

Architectural woodwork is specified in another Division-6 section.

QUALITY ASSURANCE

Factory-mark each piece of lumber and plywood with type, grade, mill and grading agency identification; except omit marking from surfaces to receive transparent finish, and submit mill certificate that material has been inspected and graded in accordance with requirements if it cannot be marked on a concealed surface.

SUBMITTALS

Product Data: Submit manufacturer's specifications and installation instructions for each item of factory-fabricated siding and paneling.

PRODUCT DELIVERY, STORAGE AND HANDLING

Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

Do not deliver finish carpentry materials, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

JOB CONDITIONS

Conditioning: Installer shall advise Contractor of temperature and humidity requirements for finish carpentry installation areas. Do not install finish carpentry until required temperature and relative humidity have been stabilized and will be maintained in installation areas.

Maintain temperature and humidity in installation area as required to maintain moisture content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.

PART 2 - PRODUCTS

WOOD PRODUCT QUALITY STANDARDS

Softwood Lumber Standards: Comply with PS 20 and with applicable grading rules of the respective grading and inspecting agency for the species and product indicated.

Plywood Standard: Comply with PS 1/ANSI A199.1.

Hardwood Lumber Standard: Comply with National Hardwood Lumber Association (NHLA) rules.

Hardwood Plywood Standard: Comply with PS 51.

Woodworking Standard: Where indicated for a specific product comply with specified provision of the following:

Architectural Woodwork Institute (AWI) "Quality Standards."

Glued-up Lumber Standard: Comply with PS 56.

MATERIALS

General:

Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and pattern as shown, unless otherwise indicated.

Moisture Content of Softwood Lumber: Provide kiln-dried (KD) lumber having a moisture content from time of manufacture until time of installation not greater than values required by the applicable grading rules of the respective grading and inspecting agency for the species and product indicated.

Moisture Content of Hardwood Lumber: Provide kiln-dried (KD) lumber having a moisture content from time of manufacture until time of installation within the ranges required in the referenced woodworking standard.

Lumber for Painted Finish: At Contractor's option, use pieces which are either glued-up lumber or made of solid lumber stock.

For exterior finish carpentry work use glued-up lumber complying with PS 56 for "wet use" and certified so by respective grading and inspecting agency for species and product indicated.

Exterior Finish Carpentry:

Standing and Running Trim: For trim in form of boards and worked products, provide lumber complying with the following requirements including those of the grading agency listed with species.

Species: White or yellow pine

Grade: D Grade clear.

Texture: Surfaced (smooth).

Plywood for Painted Finish: Any softwood species, Exterior type, Medium Density Overlay (MDO/EXT-APA), of thickness indicated.

Interior Finish Carpentry:

W/M Series Wood Molding Patterns: For stock molding patterns graded under Wood Molding and Millwork Producers Industry WM 4, provide the following grade baed on finish indicated and fabricated from any Western softwood species graded and inspected by WWPA.

Standing and Running Trim for Painted Finish: Any Western softwood species graded and inspected by WWPA complying with following requirements:

Grade for Standard Sizes and Patterns: "C Select" or "Choice" for Idaho White Pine.

Miscellaneous Materials:

Fasteners and Anchorages: Provide nails, screws and other anchoring devices of the type, size, material and finish required for application indicated to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications.

Where finish carpentry is exposed on exterior or in areas of high relative humidity, provide fasteners and anchorages with a hot-dipped zinc coating (ASTM A 153).

Screens for Soffit Vents: Provide wire cloth, 18 x 14 mesh of 0.013 diameter aluminum wire, complying with FS RR-W-365, Type VII; except black anodized "gun metal" coating on wire.

PART 3 - EXECUTION

PREPARATION

Condition wood materials to average prevailing humidity conditions in installation areas prior to installing.

Backprime lumber for painted finish exposed on the exterior or, where indicated, to moisture and high relative humidities on the interior. Comply with requirements of section on painting within Division 9 for primers and their application.

Pre-Installation Meeting: Meet at project site prior to delivery of finish carpentry materials and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor, Architect and Owner Representatives (if any), Installers of finish carpentry, wet work including plastering, other finishes, painting, mechanical work and electrical work, and firms and persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with finish carpentry on interior only when everyone concerned agrees that required ambient conditions can be properly maintained.

INSTALLATION

Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacturer with respect to surfaces, sizes or patterns.

Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level countertops; and with 1/16" maximum offset in flush adjoining 1/8" maximum offsets in revealed adjoining surfaces.

Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints.

Make exterior joints water-resistant by careful fitting.

Apply flat grain lumber with bark side exposed to weather.

ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

Clean finish carpentry work on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

Refer to Division-9 sections for final finishing of installed finish carpentry work.

Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION 06200

SECTION 06401 - EXTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

SUMMARY

This Section includes the following:

Exterior door frames.

Related Sections: The following sections contain requirements that relate to this section:

Division 6 Section "Rough Carpentry" for furring, blocking, and other carpentry that is not exposed to view.

Division 6 Section "Finish Carpentry" for interior & exterior woodwork.

Division 8 Section "Flush Wood Doors" for doors specified by reference to architectural woodwork standards.

Division 8 Section "Stile and Rail Wood Doors" for doors specified by reference to architectural woodwork standards.

Division 9 Section "Painting" for back priming and finishing of exterior architectural woodwork.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data for each type of product and process specified in this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

Wood preservative treatment data from chemical treatment manufacturer. Include certification of chemical solution and affirming compliance with indicated treatment standard.

Fire-retardant-treatment data for material impregnated by pressure process to reduce combustibility. Include certification by treating plant that treated materials comply with requirements.

Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components for all exterior wood door frames.

Samples for verification purposes of the following:

Lumber for transparent finish in form of exterior wood stain, 50 square inches, for each species, with one half of exposed surface finished with coating specified in Division 9 Section "Exterior Wood Stains."

Product certificates signed by woodwork manufacturer certifying that products comply with specified requirements.

Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

QUALITY ASSURANCE

Manufacturer Qualifications: Firm experienced in successfully producing architectural woodwork similer to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

Single-Source Fabrication and Installation Responsibility: Engage a qualified Manufacturer to assume undivided responsibility for woodwork specified in this section, including fabrication and installation.

Installer Qualifications: Arrange for installation of architectural woodwork by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this project.

AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

DELIVERY, STORAGE, AND HANDLING

Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.

PROJECT CONDITIONS

Environmental Conditions: Obtain and comply with woodwork manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage.

Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with manufacture of woodwork without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

PART 2 - PRODUCTS

MATERIALS

General: Provide materials that comply with requirements of the AWI woodworking standard for each type of woodwork and quality grade indicated and, where the following products are part of woodwork, with requirements of the referenced product standards, that apply to product characteristics indicated:

FABRICATION, GENERAL

Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.

Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

Edges of solid wood (lumber) members less than 1 inch in nominal thickness: 1/16 inch.

Edges of rails and similar members 1 inch or more in nominal thickness: 1/8 inch.

Complete fabrication, including assembly, finishing, and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

Factory-cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal edges with a water-resistant coating suitable for exterior applications.

EXTERIOR DOOR FRAMES FOR TRANSPARENT FINISH

Quality Standard: Comply with AWI Section 900A.

Grade: Custom.

Lumber Species: As indicated.

FASTENERS AND ANCHORS

Screws: Select material, type, size, and finish required for each use. Comply with FS FF-S-111 for applicable requirements.

For metal framing supports, provide screws as recommended by metal framing manufacturer.

Nails: Provide the following of type and size required for each use. Comply with FS FF-N-105 for applicable requirements.

Anchors: Select material, type, size, and finish required by each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

PART 3 - EXECUTION

PREPARATION

Condition woodwork to average prevailing humidity conditions in installation areas before installation.

Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.

Before installation of architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

INSTALLATION

Quality Standard: Install exterior woodwork to comply with requirements of AWI Section 1700 "Installation of Woodwork (Interior)" that refer to types of woodwork specified in this section and that apply to the same grade specified in Part 2 of this section.

Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 8'-0" for plumb and level and with no variations in flushness of adjoining surfaces.

Scribe and cut woodwork to fit adjoining work.

Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.

Standing and Running Trim and Rails: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns and miter at corners.

Refer to the Division 9 sections for back priming and final finishing of installed architectural woodwork.

ADJUSTMENT AND CLEANING

Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

Clean woodwork on exposed and semiexposed surfaces.

PROTECTION

Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure that woodwork is without damage or deterioration at time of Substantial Completion.

END OF SECTION 06401

SECTION 07200 - INSULATION

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of insulation work is shown on drawings and indicated by provisions of this section.

Applications of insulation specified in this section include the following:

Insulation of floors above unheated spaces.
Ceiling (attic) insulation.
Wall insulation.
Pipe soffit insulation.

Sound attenuation blankets installed as part of metal-framed gypsum drywall assemblies are specified in Division-9 section "Gypsum Drywall".

QUALITY ASSURANCE

Thermal Resistivity: Where thermal resistivity properties of insulation materials are designated by r-values they represent the rate of heat flow through a homogenous material exactly 1" thick, measured by test method included in referenced material standard or otherwise indicated. They are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

Surface Burning Characteristics: ASTM E 84.

Fire Resistance Ratings: ASTM E 119.

Combustion Characteristics: ASTM E 136.

SUBMITTALS

Product Data: Submit manufacturer's product literature and installation instructions for each type of insulation and vapor retarder material required.

Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including r-values (aged values for plastic insulations), densities, compression strengths, fire performance characteristics, perm ratings, water absorption ratings and similar properties.

DELIVERY, STORAGE, AND HANDLING

General Protection: Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Manufacturers of Glass Fiber Insulation:

CertainTeed Corp.
Knauf Fiber Glass GbmH.
Manville Corp.
Owens-Corning Fiberglas Corp.

INSULATING MATERIALS

General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.

Preformed Units: Sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.

Unfaced Flexible Glass Fiber Board Insulation: Thermal insulation produced by combining glass fibers with thermosetting resin binders to comply with ASTM C 553, Class B-4; with nominal density of 1.5 lbs. per cu. ft. and r-value of 4.13 at 75 deg.F (23.9 deg.C) and maximum flame spread and smoke developed values of 25 and 50, respectively; passing ASTM E 136 for testing and combustion characteristics.

Foil-Faced Flexible Glass Fiber Board Insulation: Thermal insulation produced by combining glass fibers with thermosetting resin binders to comply with ASTM C 553, Class B-4; with nominal density of 1.5 lbs. per cu. ft. and r-value of 4.13 at 75 deg.F (23.9 deg. C); passing ASTM E 136 for testing of combustion characteristics of unfaced board; foil-scrim-kraft vapor-retarder facing on one side with maximum flame spread and smoke developed values of 25 and 50, respectively.

Semi-Refractory Fiber Board Safing Insulation: Semi-rigid boards designed for use as a fire stop at openings between edge of slab and exterior wall panels, produced by combining semi-refractory mineral fiber manufactured from slag with thermosetting resin binders to comply with ASTM C 612, Class 1 and 2; nominal density of 4.0 lbs. per cu. ft.; passing ASTM E 136 for combustion characteristics; r-value of 4.0 at 75 deg.F (23.9 deg.C).

AUXILIARY INSULATING MATERIALS

Adhesive for Bonding Insulation: Type recommended by insulation manufacturer, and complying with requirements for fire performance characteristics.

Mechanical Anchors: Type and size indicated or, if not indicated, as recommended by insulation manufacturer for type of application and condition of substrate.

Mastic Sealer: Type recommended by insulation manufacturer for bonding edge joints between units and filling voids in work.

Eave Ventilation Troughs: Preformed rigid fiberboard or plastic sheet designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

INSPECTION AND PREPARATION

Require Installer to examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified. Obtain Installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections which might puncture vapor retarders.

INSTALLATION, GENERAL

Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.

Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

INSTALLATION OF GENERAL BUILDING INSULATION

Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

Seal joints between closed-cell (non-breathing) insulation units by applying mastic or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with mastic or sealant.

Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure air-tight installation.

Set reflective foil-faced units accurately with air space in front of foil as shown. Provide not less than 0.75" air space where possible.

Stuff loose glass fiber insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40% of normal maximum volume (to a density of approximately 2.5 lbs. per cu. ft.)

PROTECTION

General: Protect installed insulation and vapor retarders from harmful weather exposures and from possible physical abuses, where possible by nondelayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

END OF SECTION 07200

SECTION 07241 - EXTERIOR INSULATION AND FINISH SYSTEMS - CLASS PB

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of exterior insulation and finish systems is indicated on drawings.

Types of exterior insulation and finish system applications in this section include the following:

Applications over gypsum sheathing.

Gypsum sheathing behind system for field application to steel studs is specified in a Division-9 section.

Metal stud system for exterior walls supporting gypsum sheathing behind system is specified in a Division-9 section.

Sealing joints in the exterior insulation and finish system is specified in this section.

DEFINITIONS

Exterior insulation and finish system refers to an exterior assembly composed of an inner layer of thermal insulation board and an outer layer forming the protective finish coating. The assembly is applied to a supporting substrate of construction indicated. Designations below for the class and type of exterior insulation and finish system specified in this section are based on those developed by the Exterior Insulation Manufacturers Association (EIMA).

Class PB Type A designates a polymer-based protective finish coating (Class PB), externally reinforced (Type A).

System in this section refers to Class PB Type A exterior insulation and finish systems.

System manufacturer refers to the manufacturer of the exterior insulation and finish system.

SYSTEM DESCRIPTION

Provide system complying with the following performance requirements:

Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.

Weathertightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building which results in deterioration of thermal-insulating effectiveness or other degradation of system and assemblies behind system including substrates, supporting wall construction, and interior finish.

Fire Performance Characteristics: Provide materials and construction which are identical to those tested for the following fire performance characteristics, per test method indicated below, by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction:

Surface Burning Characteristics: Flame spread rating of 25 or less per ASTM E 84 for insulation board and protective finish coats, when each is tested individually.

Full Scale Fire Test: Test mock-up in form indicated below and representative of completed wall assembly of which system is a part, shows no tendency to propagate flame over the surface or through finish to the core, or for finish to delaminate when vertically mounted exterior face is exposed to a fire source, per ASTM E 108 modified for testing vertical walls as indicated below:

Provide 2 panels, 6'-0" x 10'-0", consisting of protective finish coating and 4" thickness of insulation applied to 1/2" thick gypsum board, cured for 28 days, with protective finish coating removed to leave surface of insulation exposed on one panel in an area 4" high x 24" wide centered 2'-0" above the bottom edge of panel.

Full Scale Multi-Story Fire Test: Test mock-up, representative of completed multi-story wall assembly of which system is a part, complies with Uniform Building Code Standard No. 17-6 for test method and required fire performance characteristics for exterior nonload-bearing wall panel assemblies using foam plastic insulation.

SUBMITTALS

Product Data: Manufacturer's technical data for each component of exterior insulation and finish system.

Samples for Initial Selection Purposes: Manufacturer's standard color charts and small scale samples indicating textural choices available.

Submit sealant manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available.

Samples for Verification Purposes: Samples, 2' square, for each finish, color, and texture indicated; prepare samples using same tools and techniques intended for actual work.

Incorporate within each sample a typical control joint filled with sealant of color indicated or selected.

Installer certificates signed by manufacturer certifying that Installers comply with specified requirements.

Test reports for system from a qualified independent testing laboratory certifying and interpreting test results relative to system's compliance with requirements for fire performance characteristics, bond integrity, and material properties.

Sealant compatibility and test report from sealant manufacturer certifying that materials forming joint substrates of system have been tested for compatibility and adhesion with joint sealants; include sealant manufacturer's interpretation of results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction which evidence system's compliance with building code in effect for project.

QUALITY ASSURANCE

Manufacturer Qualifications: Firm regularly engaged in manufacturing products for system indicated and with at least 5 years successful experience in applications similar to that required for this Project.

Installer Qualifications: Engage an Installer that is certified in writing by system manufacturer as qualified for installation of systems indicated.

Single Source Responsibility: Obtain materials for system from either a single manufacturer or from manufacturers approved by the system manufacturer as compatible with other system components.

Field-Constructed Mock-Up: Prior to installation of system, erect mock-ups for each form of wall construction and finish required to verify selections made under sample submittals and to demonstrate esthetic effects including those related to execution.

Build mock-ups to comply with the following requirements, using materials indicated for final work:

Locate mock-ups on site in location and of size indicated or, if not indicated, as directed by Architect.

Demonstrate the proposed range of color, texture, and workmanship to be expected in completed work.

Obtain Architect's acceptance of mock-ups before start of final work.

Retain and maintain mock-ups during construction for judging completed work.

Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed work.

Pre-Installation Conference: Conduct conference at Project site for purposes of ensuring coordinated and timely execution of work of this section; comply with Division-1 requirements.

DELIVERY, STORAGE, AND HANDLING

Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.

Store materials inside and under cover; keep them dry, protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic and other causes.

Stack insulation board flat and off the ground.

PROJECT CONDITIONS

Environmental Conditions: Do not install system when ambient outdoor temperatures are 40 deg F (4 deg C) and falling unless temporary protection and heat is provided to maintain ambient temperatures above 40 deg F (4 deg C) during installation of wet materials and for 24 hours after installation or longer to allow them to become thoroughly dry and weather resistant.

SEQUENCING AND SCHEDULING

Sequence installation of system with related work specified in other sections to ensure that wall assemblies, including flashing, trim, and joint sealers, are protected against damage from weather, aging, corrosion, or other causes.

PART 2 - PRODUCTS

MANUFACTURERS

Manufacturers: Subject to compliance with requirements, provide Class PB Type A system of one of the following:

Dryvit System, Inc.
ISPO, Inc.
Sto Industries, Inc.
Senergy Inc.

MATERIALS

Compatibility: Provide adhesive, board insulation, reinforcing fabrics, base and finish coat materials, sealants, and accessories which are compatible with one another and approved for use by system manufacturer.

Provide colors and texture of protective coating to comply with following requirements:

Provide selection made by Architect from manufacturer's full range of standard colors and textures available for type of finish coat indicated.

Surface-Sealer: System manufacturer's standard adhesion intermediary designed to improve bond between substrate of type indicated and adhesive for application of insulation.

Adhesive for Application of Insulation: System manufacturer's standard formulation designed for indicated use, compatible with substrate and complying with the following requirements:

Factory-mixed formulation designed for adhesive attachment of insulation to substrates of type indicated, as approved by system manufacturer.

Molded Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by the expansion of polystyrene resin beads or granules in a closed mold to comply with ASTM C 578 for Type I; aged in block form prior to cutting and shipping by air drying for not less than 6 weeks or by another method approved by system manufacturer and producing equivalent results; 2' x 4' x thickness indicated but not less than the minimum thickness allowed by system manufacturer; and complying with requirements of system manufacturer for corner squareness and other dimensional tolerances.

Reinforcing Fabric: Balanced, alkali-resistant open weave glass fiber fabric treated for compatibility with other system materials; made from continuous multi-end strands with tensile strength of not less than 120 lbs. and 140 lbs. in warp and fill directions,

respectively, per ASTM D 1682 and complying with ASTM D 578 and the following requirements:

Weight of Standard Reinforcing Fabric: Not less than 3.75 oz. per sq. yd.

Weight of Intermediate Weight Reinforcing Fabric: Not less than 10.0 oz. per sq. yd.

Weight of Heavy Weight Reinforcing Fabric: Not less than 16 oz. per sq. yd. Use heavy weight reinforcing fabric between first and second floors.

Weight of Strip Reinforcing Fabric: Not less than 3.75 oz. per sq. yd.

Base Coat Materials: System manufacturer's standard, job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and system manufacturer's standard polymer-based adhesive designed for use indicated.

Finish Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:

Factory-mixed formulation of polymer emulsion admixture, color-fast mineral pigments, sound stone particles, and fillers.

Particle Size: 0.05".

Water: Clean and potable.

Mechanical Fasteners: System manufacturer's standard corrosion-resistant fastener assemblies, complete with system manufacturer's standard washer and shaft attachments, selected for properties of pull-out, tensile, and shear strength required to resist design loads of application indicated, capable of pulling fastener head below surface of insulation board, and of the following description:

For attachment to steel studs from 0.033" to 0.112" in thickness provide steel drill screws complying with ASTM C 954.

For attachment to light gage steel framing members (not less than 0.0179" in thickness) provide steel drill screws complying with ASTM 1002.

ELASTOMERIC SEALANTS

Sealant Products: Provide manufacturer's standard chemically curing, elastomeric sealant which is compatible with joint fillers, joint substrates, and other related materials and complies with requirements of Division-7 section "Joint Sealers" for products corresponding to description indicated below.

Multi-Part Nonsag Urethane Sealant.

Sealant Color: Provide color of exposed sealants to comply with the following requirements:

Match finish coat color of system.

MIXING

General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as approved by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3 - EXECUTION

EXAMINATION

Examine substrates, with Installer present, to determine if they are in satisfactory condition for installation of system. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

PREPARATION

Protect contiguous work from moisture deterioration and soiling resulting from application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coatings on other work.

Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.

Substrate Preparation: Prepare and clean substrates to comply with system manufacturer's requirements to obtain optimum bond between substrate and adhesive for insulation.

Apply surface-sealer over substrates where required by system manufacturer for improving adhesion.

INSTALLATION

General: Comply with system manufacturer's current published instructions for installation of system as applicable to each type of substrate indicated.

Adhesively and mechanically attach insulation to comply with the following requirements:

Allow adhered insulation to remain undisturbed for period prescribed by system manufacturer but not less than 24 hours, prior to beginning rasping and sanding insulation or application of base coat and reinforcing fabric.

Apply boards over dry substrates in courses with long edges oriented horizontally; begin first course from a level base line and work upwards.

Stagger vertical joints in successive courses to produce running bond pattern.

Offset joints of insulation from joints in sheathing.

Interlock ends at internal and external corners.

Abut boards tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between insulation boards. If gaps occur, fill with insulation cut to fit gaps exactly; insert without use of adhesive.

Rasp or sand flush any irregularities projecting more than 1/32" from surface of insulation; do not create depressions deeper than 1/16".

Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes conforming to details indicated.

Interrupt insulation where expansion joints are indicated in substrates behind exterior insulation and finish systems.

Form joints for sealant application by leaving gaps of width needed between adjoining insulation edges as well as between insulation edges and dissimilar adjoining surfaces projecting through insulation that produce joint widths indicated after encapsulation of joint substrates with base coat, reinforcing fabric, and finish coat.

Treat exposed edges of insulation board, including those forming substrates of sealed joints within system or between system and other work, by encapsulating with base coat, reinforcing fabric, and finish coat.

Coordinate flashing installation with installation of insulation to produce a wall system which does not allow water to penetrate behind protective coating.

Apply base coat to exposed surfaces of insulation in minimum thickness specified by system manufacturer.

Fully embed reinforcing fabric of weight indicated below in wet base coat to produce wrinkle-free installation with fabric continuous at corners and lapped or otherwise treated at joints to comply with system manufacturer's requirements.

Fabric Weight: Standard, unless otherwise indicated.
Fabric Weight: Heavy between first and second floors and where indicated.

Double Layer Application: Where indicated, apply a second base coat and second layer of reinforcing fabric of weight indicated below, in same manner as first application. Do not apply until first base coat has cured.

Fabric Weight: Standard, unless otherwise indicated.

Apply finish coat over dry base coat in thickness required by system manufacturer to produce a uniform finish of texture and color matching approved sample.

INSTALLATION OF JOINT SEALANTS

Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements of Division-7 section "Joint Sealers".

CLEANING AND PROTECTION

Remove temporary covering and protection of other work. Promptly remove protective coatings from window and door frames, and any other surfaces outside areas indicated to receive protective coating.

Provide final protection and maintain conditions, in a manner acceptable to Installer and system manufacturer, which ensures system being without damage or deterioration at time of Substantial Completion.

END OF SECTION 07241

SECTION 07311 - ASPHALT SHINGLES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of shingles is indicated on drawings and is hereby defined to include units employed as weather protection for walls as well as for steep roofs.

QUALITY ASSURANCE

UL Listing: Provide labeled materials which have been tested and listed by UL for Class and Rating indicated for each shingle type required.

SUBMITTALS

Product Data: Submit technical product data, installation instructions and recommendations from shingle manufacturer, including data that materials comply with requirements.

Samples: Submit full range of samples for color and texture selection. After selection, submit 2 full-size shingles for verification of each color/style/texture selected.

Maintenance Stock: 2% of each type/color/texture shingle used in the work.

DELIVERY, STORAGE AND HANDLING

Deliver materials in manufacturer's unopened, labeled bundles, rolls or containers.

Store materials to avoid water damage, and store rolled goods on end. Comply with manufacturer's recommendations for job-site storage and protection.

JOB CONDITIONS

Substrate: Proceed with shingle work only after substrate construction and penetrating work have been completed.

Weather Conditions: Proceed with shingle work only when weather conditions are in compliance with manufacturer's recommendations and when substrate is completely dry.

SPECIFIED PRODUCT WARRANTY

Provide shingle manufacturer's warranty on installed work, agreeing to pay for repair or replacement of defective shingles as necessary to eliminate leaks. Period of warranty is 20 years from date of substantial completion.

PART 2 - PRODUCTS

ASPHALT SHINGLE MATERIALS

Square Tab Strip Shingles, UL Class "A", Standard Weight: Mineral-surfaced, self-sealing, 3-tab asphalt fiberglass strip shingles complying with ASTM D 3018, bearing UL Class "A" external fire exposure label and UL "Wind Resistant" label. Color as selected by Architect.

Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

Firescreen Bird & Son/Genstar Building Materials Co.
Fiberglass Asphalt/20; The Celotex Corp.
Glassguard; Certainteed Corp.
Brigade; Flintkote/Genstar Building Materials Co.
Sentinal; GAF Corporation.
Tough-Glass; Georgia-Pacific.
Fire-glass III; Manville Building Materials Corp.
Classic Plus; Owens-Corning Fiberglas Corp.

Asphalt-Saturated Roofing Felt: No. 15, unperforated organic felt, complying with ASTM D 226 Type I, 36" wide, approximate weight 18 lbs./square.

Smooth Surface Roll Roofing: Smooth surface asphalt roll roofing, 36" wide, complying with ASTM D 224, Type II.

Mineral-Surfaced Roll Roofing: Mineral-surfaced No. 90 asphalt roll roofing, complying with ASTM D 249 and surfaced on weather side with mineral granules to match roofing shingles, with 2" selvage edge, and bearing UL Class "C" label.

Asphalt Plastic Cement: Fibrated asphalt cement complying with ASTM D 2822, designed for trowel application.

Hip and Ridge Shingles: Manufacturer's standard factory pre-cut units to match shingles.

Nails: Aluminum or hot-dip galvanized 11 or 12-gage sharp-pointed, conventional roofing nails with barbed shanks, minimum 3/8" diameter head, and of sufficient length to penetrate 3/4" into solid decking or to penetrate through plywood sheathing.

Metal Drip Edge: Minimum .024" mill finish aluminum sheet, brake-formed to provide 3" roof deck flange, and 1-1/2" fascia flange with 3/8" drip at lower edge. Furnish in 8' or 10' lengths.

PART 3 - EXECUTION

INSPECTION

Examine substrate and conditions under which shingling work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with shingling work until unsatisfactory conditions have been corrected.

PREPARATION OF SUBSTRATE

Clean substrate of any projections and substances detrimental to shingling work. Cover knotholes or other minor voids in substrate with sheet metal flashing secured with roofing nails.

Coordinate installation of shingles with flashing and other adjoining work to ensure proper sequencing. Do not install shingle roofing until all vent stacks and other penetrations through roofing have been installed and are securely fastened against movement.

INSTALLATION

General: Comply with instructions and recommendations of shingle manufacturer, except to extent more stringent requirements are indicated.

Underlayment: Apply one layer felt horizontally over entire surface, lapping succeeding courses 2" minimum and fastening with sufficient nails to hold in place until shingle application.

Ice Protection Underlayment: In addition to felt underlayment, install continuous strip of ice protection underlayment of No. 90 asphalt roll roofing along eaves to a point 12" minimum beyond wall line. Set in continuous bed of asphalt plastic cement and secure with roofing nails at 6" centers along all edges. Provide 2" laps where required, set in roofing cement. If head laps are required, install so head lap occurs 12" before wall line.

Shingles: Install starter strip of roll roofing: fasten shingles in pattern, weather exposure and number of fasteners per shingle as recommended by manufacturer. Use horizontal and vertical chalk lines to ensure straight coursing.

Comply with installation details and recommendations of shingle manufacturer and NRCA Steep Roofing Manual.

Flashing and Edge Protection: Install metal flashing, vent flashing and edge protection as indicated and in compliance with details and recommendations of the NRCA Steep Roofing Manual and in accordance with the provisions of Flashing and Sheet Metal section of Division Seven.

EXTRA STOCK

Provide minimum of 2% of installed quantity of each type/color/texture shingle used in the work. Provide in unopened clearly labeled bundles or containers.

END OF SECTION 07311

SECTION 07530 - FLEXIBLE SHEET ROOFING SYSTEM

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of flexible sheet roofing (FSR) is indicated on drawings and is hereby defined to include non-traffic-bearing sheet membrane system intended for weather exposure as primary roofing.

Types of roofing systems specified in this section utilizing flexible sheet roofing membranes include the following:

Totally adhered systems.

Flexible sheet roofing membranes include the following:

Ethylene propylene diene monomer (EPDM)

Vapor retarder below insulation is specified in this section.

Similar membranes concealed by a wearing surface are excluded by definition and, if required, are specified elsewhere in Division 7 as waterproofing.

SUBMITTALS

Product Data: Submit specifications, installation instructions and general recommendations from manufacturers of flexible sheet roofing system materials, for types of roofing required. Include data substantiating that materials comply with requirements.

QUALITY ASSURANCE

Manufacturer: Obtain primary flexible sheet roofing from a single manufacturer. Provide secondary materials as recommended by manufacturer of primary materials.

Installer: A firm with not less than 3 years of successful experience in installation of roofing systems similar to those required for this project and which is acceptable to or licensed by manufacturer of primary roofing materials.

Work associated with flexible sheet roofing, including (but not limited to) vapor retarders, insulation, flashing and counterflashing, expansion joints, and flexible sheet joint sealers, is to be performed by Installer of flexible sheet roofing.

UL Listing: Provide labeled materials which have been tested and listed by UL in "building Materials Directory" for application indicated, with "Class A" rated materials/system for roof slopes shown:

Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction:

Surface Burning Characteristics: ASTM E 84.

Fire Resistance Ratings: ASTM E 119.

Combustion Characteristics: ASTM E 136.

PROJECT CONDITIONS

Weather: Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

SPECIAL PROJECT WARRANTY

Provide written warranty, signed by Manufacturer of primary roofing materials and his authorized Installer, agreeing to replace/repair defective materials and workmanship as required to maintain roofing system in watertight condition.

Warranty period is 10 years after date of substantial completion.

PART 2 - PRODUCTS

GENERAL

Performance: Provide roofing materials recognized to be of generic type indicated and tested to show compliance with indicated performances, or provide other similar materials certified in writing by manufacturer to be equal or better than specified in every significant respect, and acceptable to Architect.

Compatibility: Provide products which are recommended by manufacturers to be fully compatible with indicated substrates, or provide separation materials as required to eliminate contact between incompatible materials.

EPDM FSR MEMBRANE

Ethylene propylene diene monomers formed into uniform, flexible sheets, complying with ANSI/RMA IPR-1:

Thickness: 60 mils, nominal.

Exposed Face Color: Manufacturer's standard

Fully Adhered EPDM Membrane:

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

American Hydrotech
Barra Corp. of America
Carlisle Syntec Systems
Celotex Corp.
ERA Corp.
Firestone Building Products Co.
Kelly Energy Systems, Inc.
Manville Building Materials Corp.
Syenergy Methods, Inc.

PART 3 - EXECUTION

PREPARATION OF SUBSTRATE

General: Comply with manufacturer's instructions for preparation of substrate to receive FSR system.

Clean substrate of dust, debris, and other substances detrimental to FSR system work. Remove sharp projections.

Install cant strips, flashings, and accessory items as shown, and as recommended by manufacturer even though not shown.

Prevent compounds from entering and clogging drains and conductors, and from spilling or migrating onto surfaces of other work.

INSTALLATION

General: Comply with manufacturer's instructions, except where more stringent requirements are indicated.

MEMBRANE INSTALLATION

General: Start installation only in presence of manufacturer's technical representative.

Adhesive-Adhered FSR: Install membrane by unrolling over prepared substrate, lapping adjoining sheets as recommended by manufacturer. Apply adhesive to surfaces to be bonded and roll FSR into place when adhesive has properly cured. Treat seams with special cement and apply sealant to exposed sheet edges, tapering application as recommended by manufacturer. Install mechanical fasteners, flashings and counterflashings, and accessories at locations and as recommended by manufacturer.

END OF SECTION 07530

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of each type of flashing and sheet metal work is indicated on drawings and by provisions of this section.

Types of work specified in this section include the following:

Metal counter flashing; and base flashing (if any).

Metal wall flashing and expansion joints.

Gutters and downspouts (rain drainage).

Exposed metal trim/fascia units.

Miscellaneous sheet metal accessories.

Elastic flashing.

Elastic roof/wall expansion joint systems.

Laminated and composition flashing.

Integral masonry flashings are specified as masonry work in sections of Division-4.

Roofing accessories which are installed integral with roofing membrane are specified in roofing system sections as roofing work.

Roof accessory units of premanufactured, set-on type are specified in Division-7 section "Roof Accessories".

SUBMITTALS

Product Data: Flashing, Sheet Metal, Accessories: Submit manufacturer's product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

JOB CONDITIONS

Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protection of materials and finishes.

PART 2 - PRODUCTS

FLASHING AND SHEET METAL MATERIALS

Sheet Metal Flashing/Trim:

Copper: ASTM B 370; temper HØØ (cold rolled) except where temper 06Ø is required for forming; 16 oz. (0.0216 inch thick) except as otherwise indicated.

Provide lead coating of 0.06 lbs. per sq. ft. on exposed copper surfaces.

Aluminum: ASTM B 209, alloy 3003, temper H14, baked enamel finish; 0.032 inch thick (20 gauge) except as otherwise indicated.

Extruded Aluminum: Manufacturer's standard extrusions of sizes and profiles indicated, 6063-T52, baked enamel finish; 0.06" minimum thickness for primary legs of extrusions.

Elastic Sheet Flashing/Membrane: Manufacturer's standard flexible, elastic, black, nonreinforced, flashing sheet of 50 - 65 mils thickness; 50 - 70 Shore A hardness (ASTM D 2240); 1200 psi tensile strength (ASTM D 412); 120 lbs. per lin. in. tear resistance (ASTM D 624, Die C); ultimate elongation of 250% (ASTM D 412); brittleness temperature of -30 degrees F (- 35 degrees C) (ASTM D 746); resistance to ozone aging of no cracks for 10% elongated sample for 100 hours in 50 pphm (50.5 mPa) ozone at 104 degrees F (70 degrees C) (ASTM D 1149); resistance to heat aging of maximum hardness increase of 15 points, elongation reduction of 40%, and tensile strength reduction of 30%, for 70 hours at 212 degrees F (100 degrees C) (ASTM D 573).

Provide EPDM synthetic rubber sheet.

Miscellaneous Materials and Accessories:

Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.

Solder: For use with stainless steel, provide 60 - 40 tin/lead solder (ASTM B 32), with acid-chloride type flux, except use rosin flux over tinned surfaces.

Fasteners: Same metal as flashing/sheet metal or, other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

Bituminous Coating: FS TT-C-494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed; comply with FS TT-S-00227, TT-S-00230, or TT-S-001543.

Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.

Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

Paper Slip Sheet: 5-lb rosin-sized building paper.

Polyethylene Underlayment: 6-mil carbonated polyethylene film; FS L-P-512.

Reglets: Metal or plastic units of the type and profile indicated, compatible with flashing indicated, noncorrosive.

Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

Cast-Iron Drainage Boots: Grey iron castings of size and pattern indicated, ASTM A 48, bituminous shop coated.

Gutter and Conductor-Head Guards: 20-gage bronze or nonmagnetic stainless steel mesh or fabricated units, with selvaged edges and noncorrosive fasteners. Select materials for compatibility with gutters and downspouts.

Elastic Flashing Filler: Closed-cell polyethylene or other soft closed-cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.

Roofing Cement: ASTM D 2822, asphaltic.

FABRICATED UNITS

General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).

Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

Aluminum Extrusion Units: Fabricate extruded aluminum running units with formed or extruded aluminum joint covers, for installation behind main members where possible. Fabricate mitered and welded corner units.

Shop Finish, Rain Drainage: Provide manufacturer's standard baked-on white acrylic shop finish on aluminum gutters; 1.0 mil dry film thickness. Downspouts shall be unfinished copper.

PART 3 - EXECUTION

INSTALLATION REQUIREMENTS

General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true

to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.

Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof perfopolyethylene underlayment.

Install reglets to receive counter-flashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division-4 sections.

Install counter-flashing in reglets, either by snap-in seal arrangement, or by wedging in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

Install elastic flashing in accordance with manufacturer's recommendations. Where required, provide for movement at joints by forming loops or bellows in width of flashing. Locate cover or filler strips at joints to facilitate complete drainage of water from flashing. Seam adjacent flashing sheets with adhesive, seal and anchor edges in accordance with manufacturer's recommendations.

CLEANING AND PROTECTION

Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION 07600

SECTION 07700 - ROOF SPECIALTIES AND ACCESSORIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent and locations of roof accessories is indicated on the drawings and by provisions of this section.

Types of units specified in this section include the following:

Roof hatches.

Roof window units.

Refer to roofing system sections of these specifications for roofing accessories to be built into roofing system (not work of this section).

SUBMITTALS

Product Data: Roof Accessories: Submit manufacturer's technical product data, rough-in diagrams, details, installation instructions and general product recommendations.

Coordination Drawings: Submit coordination drawings for items interfacing with or supporting mechanical or electrical equipment, ductwork, piping, or conduit. Indicate dimensions and locations of items provided under this section, together with relationships and methods of attachment to adjacent construction and to mechanical/electrical items.

QUALITY ASSURANCE

Standards: Comply with SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated. Comply with "NRCA Roofing and Waterproofing Manual" details for installation of units.

PART 2 - PRODUCTS

GENERAL PRODUCT REQUIREMENTS

Provide manufacturers' standard units, modified as necessary to comply with requirements. Shop fabricate each unit to greatest extent possible.

MATERIALS, GENERAL

Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A 525, G90 hot-dip galvanized, mill phosphatized.

Stainless Steel: AISI Type 302/304, ASTM A 167, 2D annealed finish except as otherwise indicated, temper as required for forming and performance.

Aluminum Sheet: ASTM B 209, alloy 3003, temper as required for forming and performance; AA-C22A41 clear anodized finish, except mill finish prepared for painting where indicated for field painting.

Extruded Aluminum: Manufacturer's standard extrusions of sizes and general profiles indicated, alloy 6063-T52; 0.078" minimum thicknesses for primary framing and curb member legs, 0.062" for secondary legs; AA-C22A41 clear anodized finish on exposed members, except as otherwise indicated.

Insulation: Manufacturer's standard rigid or semi-rigid board of glass fiber of thicknesses indicated.

Wood Nailers: Softwood lumber, pressure treated with water-borne preservatives for above-ground use, complying with AWPB LP-2; not less than 1-1/2" thick.

Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.

> Where removal of exterior exposed fasteners affords access to building, provide nonremovable fastener heads.

Gaskets: Tubular or fingered design of neoprene or polyvinyl chloride, or block design of sponge neoprene.

Bituminous Coating: FS TT-C-494 or SSPC-Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coating.

Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

Elastomeric Sealant: Generic type recommended by unit manufacturer, which is compatible with joint surfaces; comply with FS TT-S-00227-E, TT-S-00230C, or TT-S-001543A.

Roofing Cement: ASTM D 2822, asphaltic.

ROOF WINDOW UNITS

Roof Window Units: Velux Model FS with VP Curb Flashing System.

PREFABRICATED ROOF HATCHES

General: Fabricate units of sizes shown, single-leaf type unless otherwise indicated, for 40 lbs. per sq. ft. external loading and 20 lbs. per sq. ft. internal loading pressure. Frame with 12" high integral-curb double-wall construction with 1" insulation, cant strips and cap flashing (roofing counter-flashing), with welded or sealed mechanical corner joints. Provide double-wall cover (lid) construction with 1" insulation core. Equip units with complete hardware set including hold-open devices, interior padlock hasps, and both interior and exterior latch handles. Provide gasketing. Fabricate units of following materials:

Materials: Zinc-coated steel sheets.

Size: 2'-6" x 3'-0".

Sloping Roofs: Where slope of roof deck exceeds 1/4" per ft., fabricate hatch curbs with height tapered to match slope, to result in level installation of tops of units.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering prefabricated roof hatch units which may be incorporated in the work include, but are not limited to, the following:

Bilco Co.; New Haven, CT
Bohem Skylites, Inc.; Burlington, NJ
Bristol Fiberlite Industries; Santa Anna, CA
Dur-Red Products; Cudahy, CA
Faulkner Plastics, Inc.; Tampa, FL
Hillsdale Industries, Inc.; Knoxville, TN
Naturalite, Inc.; Garland, TX
Milcor Inc.; Lima, OH
O'Keefe's, Inc.; San Francisco, CA
Plasteco, Inc.; Houston, TX
Vasco Products, Inc.; Sanford, ME

PART 3 - EXECUTION

INSTALLATION

General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and vapor barriers, roof insulation, roofing and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

Except as otherwise indicated install roof accessory items in accordance with construction details of "NRCA Roofing and Waterproofing Manual".

Isolation: Where metal surfaces of units are to be installed in contact with noncompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.

Flange Seals: Except as otherwise indicated, set flanges of accessory units in a thick bed of roofing cement, to form a seal.

Cap Flashing: Where cap flashing is required as component of accessory, install to provide adequate waterproof overlap with roofing or roof flashing (as counter flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

Operational Units: Test operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

CLEANING AND PROTECTION

Clean exposed metal and plastic surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

Clean and polish roof window units, inside and out, not more than 5 days prior to date of substantial completion.

END OF SECTION 07700

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.

SUMMARY

Extent of each form and type of joint sealer is indicated on drawings and schedules.

This Section includes joint sealers for the following locations:

Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:

Control and expansion joints in cast-in-place concrete.
Control and expansion joints in unit masonry.
Joints of stonework set without mortar.
Joints between different materials listed above.
Perimeter joints between materials listed above and frames of doors and windows.
Control and expansion joints in ceiling and overhead surfaces.
Other joints as indicated.

Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:

Control and expansion joints on exposed interior surfaces of exterior walls.
Perimeter joints of exterior openings where indicated.
Joints between tops of non-load-bearing unit masonry walls and underside of cast-in-place concrete slabs and beams.
Tile control and expansion joints.
Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
Perimeter joints between interior wall surfaces and hollow metal frames of interior doors, windows, and elevator entrances.
Perimeter joints of toilet fixtures.
Other joints as indicated.

Sealing joints in exterior insulation and finish system is specified in the following Division-7 section:

"Exterior Insulation and Finish Systems - Class PB."

Sealing joints related to flashing and sheet metal for roofing is specified in Division-7 Section: "Flashing and Sheet Metal."

Sealants for glazing purposes are specified in Division-8 Section "Glass and Glazing."

Sealing concealed perimeter joints of gypsum drywall partitions to reduce sound transmission characteristics is specified in Division-9 Section "Gypsum Drywall."

SYSTEM PERFORMANCES

Provide joints sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

SUBMITTALS

Product Data from manufacturer's for each joint sealer product required, including instructions for joint preparation and joint sealer application.

Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.

Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.

Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project name, addresses, names of Architects and Owners, plus other information specified.

Product test reports for each type of joint sealers indicated, evidencing compliance with requirements specified.

Preconstruction field test reports indicating which products and joint preparation methods demonstrated acceptable adhesion to joint substrates.

QUALITY ASSURANCE

Installer Qualifications: Engage an Installer who has successfully completed within the last 3 years at least 3 joint sealer applications similar in type and size to that of this Project.

Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

Preconstruction Compatibility and Adhesion Testing: Submit samples of all materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing, as indicated below:

Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates.

Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.

Investigate materials failing compatibility or adhesion tests and obtain joint sealer manufacturer's written recommendations for corrective measures, including use of specially formulated primers.

Testing will not be required when joint sealer manufacturer is able to submit joint preparation data required above which is acceptable to Architect and is based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

Product Testing: Provide comprehensive test data for each type of joint sealer based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.

Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.

Field-Constructed Mock-Ups: Prior to installation of joint sealers, apply elastomeric sealants to the following selected building joints as indicated below for further verification of colors selected from sample submittals and to represent completed work for qualities of appearance, materials and application:

Joints in field-constructed mock-ups of assemblies specified in other sections which are indicated to receive elastomeric joint sealants in this section.

Retain mock-ups during construction as standard for judging completed construction.

DELIVERY, STORAGE, AND HANDLING

Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multicomponent materials.

Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PROJECT CONDITIONS

Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:

When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.

When joint substrates are wet due to rain, frost, condensation or other causes.

Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

SEQUENCING AND SCHEDULING

Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

MATERIALS, GENERAL

Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

Colors: Provide color of exposed joint sealer indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

ELASTOMERIC JOINT SEALANTS

Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class and Uses.

One-Part Nonacid-Curing Silicone Sealant: Type S; Grade NS; Class 25; and complying with the following requirements for Uses and additional joint movement capability:

Uses NT, M, G, A, and, as applicable to joint substrates indicated, O.

Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the following, percentage increase and decrease of joint width as measured at time of application and remain in compliance with other requirements of ASTM C 920 for uses indicated.

50 percent movement in both extension and compression for a total of 100 percent movement.

One-Part Acid-Curing Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to joint substrates indicated, O.

One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide; intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

Multi-Part Pourable Urethane Sealant for Use T: Type M, Grade P, Class 25, and complying with the following requirements for:

Uses T, M, and, as applicable to joint substrates indicated, O.

Available Products: Subject to compliance with requirements, elastomeric sealants which may be incorporated in the Work include, but are not limited to, the following:

One-Part Nonacid-Curing Silicone Sealant:

"Chem-Calk N-Cure 2000"; Bostik Construction Products Div.
"Dow Corning 790"; Dow Corning Corp.
"Silglaze N SCS 2501"; General Electric Co.
"Silpruf SCS 2000"; General Electric Co.
"864"; Pecora Corp.
"Rhodorsil 5C"; Rhone-Poulenc Inc.
"Spectrum 1"; Tremco, Inc.
"Spectrum 2"; Tremco, Inc.

One-Part Acid-Curing Silicone Sealant:

"Chem-Calk 1200"; Bostik Construction Products Div.
"Dow Corning 999A"; Dow Corning Corp.
"SCS 1000"; General Electric Co.
"Construction 1200"; General Electric Co.
"863"; Pecora Corp.
"Rhodorsil 3B"; Rhone-Poulenc Inc.
"Rhodorsil 90"; Rhone-Poulenc Inc.
"OmniPlus"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
"Proglaze"; Tremco, Inc.

One-Part Mildew-Resistant Silicone Sealant:

"Dow-Corning 786"; Dow Corning Corp.
"SCS 1702 Sanitary"; General Electric Co.
"863 #345 White"; Pecora Corp.
"Rhodorsil 6B White"; Rhone-Poulenc Inc.
"Proglaze White"; Tremco Corp.
"OmniPlus"; Sonneborn Building Products Div., Rexnord Chemical Products Inc.

Multi-Part, Pourable, Urethane Sealant for Use T:

"Chem-Calk 550"; Bostik Construction Products Div.
"Vulkem 245"; Mameco International, Inc.
"Vulkem 255"; Mameco International, Inc.
"Pourthane"; W.R. Meadows, Inc.
"NR-200 Urexpan"; Pecora Corp.
"PRC 280"; Products Research & Chemical Corp.
"Sikaflex 2c SL"; Sika Corp.
"Sonolastic Paving Joint Sealer"; Sonneborn Building Products Div., Rexnord Chemical Products Inc.
"THC-900"; Tremco Inc.

LATEX JOINT SEALANTS

Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, acrylic, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be painted and recommended for exposed applications on interior and on protected exterior locations involving joint movement of not more than plus or minus 5 percent.

Available Products: Subject to compliance with requirements, latex joint sealants which may be incorporated in the Work include, but are not limited to, the following:

Acrylic-Emulsion Sealant:

"Chem-Calk 600"; Bostik Construction Products Div.
"AC-20"; Pecora Corp.

"Sonolac"; Sonneborn Building Products Div.; Rexnord Chemical Products, Inc.
"Tremco Acrylic Latex 834"; Tremco Inc.

MISCELLANEOUS JOINT SEALANTS

COMPRESSION SEALS:

Preformed Foam Sealant: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellant agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:

Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, compatible with joint substrates and other joint sealers.

Impregnating Agent: Manufacturer's standard.

Density: Manufacturer's standard.

Backing: None.

Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

"Emseal"; Emseal Corp.
"Emseal Greyflex"; Emseal Corp.
"Polytite R"; Sandell Manufacturing Co., Inc.
"Polytite Standard"; Sandell Manufacturing Co., Inc.
"Will-Seal 150"; Will-Seal Construction Foams Div., Illbruck.
"Will-Seal 250"; Will-Seal Construction Foams Div., Illbruck.
"York-Seal 100"; York Manufacturing, Inc.
"York-Seal 200"; York Manufacturing, Inc.

JOINT SEALANTS FOR PAVING:

Two-Part Jet-Fuel-Resistant Cold-Applied Sealant: Manufacturer's standard, pourable, chemically-curing, elastomeric sealant complying with FS SS-S-200 and of the following formulation for base polymer.

Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

Two-Part Jet-Fuel-Resistant Cold-Applied Sealant:

"Vulkem 202"; Mameco International, Inc.
"Gardox"; W.R. Meadows, Inc.

"Urexpan NR-300"; Pecora Corp.
"Sonomeric CT 2"; Sonneborn Building Products Div., Rexnord Chemical Products Inc.

FIRE-RESISTANT JOINT SEALERS

General: Provide manufacturer's standard fire-stopping sealant, with accessory materials, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

Foamed-In-Place Fire-Stopping Sealant: Two-part, foamed-in-place, silicone sealant formulated for use in a through-penetration fire-stop system for filling openings around cables, conduit, pipes and similar penetrations through walls and floors.

One-Part Fire-Stopping Sealant: One part elastomeric sealant formulated for use in a through-penetration fire-stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.

Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

Foamed-In-Place Fire-Stopping Sealant:

"Dow Corning Fire Stop Foam"; Dow Corning Corp.
"Pensil 851"; General Electric Co.

One-Part Fire-Stopping Sealant:

"Dow Corning Fire Stop Sealant"; Dow Corning Corp.
"3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
"RTV 7403"; General Electric Co.
"Tyre Putty"; Standard Oil Engineered Materials Co.

JOINT SEALANT BACKING

General: Provide sealant backings of material and type which are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of flexible, nongassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

Either open cell polyurethane foam or closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.

Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

MISCELLANEOUS MATERIALS

Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer substrate tests and field tests.

Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturer of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

Accessory materials for Fire-Stopping Sealants: Provide forming, joint-fillers, packing and other accessory materials required for installation of fire-stopping sealants as applicable to installation conditions indicated.

JOINT FILLERS FOR CONCRETE PAVING

General: Provide joint fillers of thickness and widths indicated.

Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:

Asphalt saturated fiberboard.

PART 3 - EXECUTION

EXAMINATION

Examine joints indicated indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

PREPARATION

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt and frost.

Clean concrete,masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

Remove laitance and form release agents from concrete.

Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

INSTALLATION OF JOINT SEALERS

General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

Install joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

Do not leave gaps between ends of joint-fillers.

Do not stretch, twist, puncture or tear joint fillers.

Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrappings, taking care not to pull or stretch material, and complying with sealant manufacturer's directions for installation methods, materials and tools which produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

Installation of Fire-Stopping Sealant: Install sealant, including forming, packing and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

CLEANING

Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

PROTECTION

Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

JOINT SEALANT SCHEDULE

Multi-Part Pourable Urethane Sealant: Exterior and interior joints in horizontal surfaces of concrete; between metal and concrete, mortar, stone and masonry.

One-Part Nonacid-Curing Silicone Sealant: Exterior and interior joints in vertical surfaces of concrete and masonry; between concrete masonry and stone; between metal and concrete, mortar, or stone; interior and exterior perimeter joints of metal frames in exterior walls; and exterior overhead joints.

One-Part Acid-Curing Silicone Sealant: Exposed joints within aluminum entrance framing systems.

One-Part Mildew-Resistant Silicone Sealant: Interior joints in vertical surfaces of ceramic tile in shower surrounds.

Acrylic-Emulsion Sealant: Interior joints in field-painted vertical and overhead surfaces at perimeter of elevator door frames and hollow metal door frames; in gypsum drywall, and concrete or concrete masonry; and all other interior joints not indicated otherwise.

Foamed-In-Place Fire Stopping Sealant: Through penetrations in fire resistance rated floor and wall assemblies involving multiple pipes, conduits and other items.

One-Part Fire-Stopping Sealant: Through penetrations in fire resistance rated floor and wall assemblies involving single pipes, conduits where joint widths are narrow and of uniform width.

END OF SECTION 07900

SECTION 08110 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of standard steel doors and frames is shown and scheduled on drawings.

Builder's hardware is specified in Section 08700.

QUALITY ASSURANCE

Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.

Fire-Rated Door Assemblies: Where fire-rated doors assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

SUBMITTALS

Product Data: Submit manufacturer's specifications for fabrication and installation, including data substantiating that products comply with requirements.

Shop Drawings: Submit for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

Indicate coordinate of glazing frames and stops with glass and glazing requirements.

Label Construction Certification: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification for oversize fire-rated doors and frames that each assembly has been constructed with materials and methods equivalent to requirements for labeled construction.

DELIVERY, STORAGE AND HANDLING

Deliver hollow metal work cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory-finished doors.

Inspect metal work upon delivery for damage. Minor damages may be repaired provided finish items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

Store doors and frames at building site under cover. Place units on wood sills at least 4" high, or otherwise store on floors in manner that will prevent rust and damage. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering steel doors and frames which may be incorporated in the work include; but are not limited to, the following.

Manufacturer: Subject to compliance with requirements, provide steel doors and frames by one of the following:

Steel Doors and Frames, (General):

Allied Steel Products, Inc.
Amweld/Div. American Welding & Mfg. Co.
Ceco Corp.
Copco Door Co.
Curries Mfg., Inc.
Fenestra Corp.
Kewanee Corp.
Mesler Industries, Inc.
Pioneer Bldrs. Products Corp./Div. CORE Industries, Inc.
Steelcraft/Div. American Standard Co.
Trussbilt, Inc.
Republic Builders Products Corp./Subs. Republic Steel.

MATERIALS

Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A568.

Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.

Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, with ASTM A 525, G60 zinc coating, mill phosphatized.

Supports and Anchors: Fabricate of not less than 18 gage galvanized sheet steel.

Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanized items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.

Shop Applied Paint:

Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

FABRICATION, GENERAL

Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site. Comply with SDI-100 requirements as follows.

Interior Doors: SDI-100, Grade II, heavy-duty, Model 1, minimum 18 gage faces.

Exterior Doors: SDI-100, Grade III, extra heavy-duty, Model 2, minimum 16-gage faces.

Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel.

Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).

Fabricate exterior doors, panels, and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gage inverted steel channels.

Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

Thermal-Rated (Insulating) Assemblies:

At exterior locations and elsewhere as shown or scheduled, provide doors which have been fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C236.

Unless otherwise indicated, provide thermal-rated assemblies with U factor for thermal-rated assemblies of 0.24 Btu(/hr x ft2 x degrees F).

Finish Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and provided by hardware supplier. Comply with applicable requirements of ANSI A 115 series specifications for door and frame preparation for hardware.

Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with "Recommended Locations for Builder's Hardware," published by Door and Hardware Institute.

Shop Painting:

Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.

Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

STANDARD STEEL DOORS

Provide metal doors of types and styles indicated on drawings or schedules.

Door Louvers:

Provide sight proof stationary louvers for interior doors where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24-gage cold-rolled steel set into 20-gage steel frame.

STANDARD STEEL FRAMES

Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings,

unless otherwise indicated. Fabricate frames of minimum 16-gage cold-rolled furniture steel for interior openings to 3'-4" wide and 14-gage cold-rolled furniture steel for interior openings greater than 3'-4" wide and all exterior openings.

Fabricate all frames in exterior openings and interior frames located in masonry openings with mitered and welded corners.

Fabricate frames in interior drywall openings with mitered corners knocked-down, for field assembly.

Form exterior frames of hot dip galvanized steel.

Door Silencers: Except on weatherstripped frames, drill stops to receive 2 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.

Plaster Guards: Provide 26-gage steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

PART 3 - EXECUTION

INSTALLATION

General: Install standard steel doors, frames, and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.

Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.

Except for frames located at in-place concrete or at drywall installations, place frames prior to construction at enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

In masonry construction, locate 3 wall anchors pre jamb at hinge and strike levels.

Install fire-rated frames in accordance with NFPA Std. No. 80.

In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with tapping screws.

Door Installation:

Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.

Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

ADJUST AND CLEAN

Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION 08110

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to of this section.

SUMMARY

Extent and location of each type of flush wood door is indicated on drawings and in schedules.

Types of doors required include the following:

Solid core flush wood doors with wood veneer faces.

Hollow core flush doors with hardboard faces.

Shop-priming of flush wood doors is included in this section.

Factory-prefitting to frames and factory-premachining for hardware for wood doors is included in this section.

Wood door frames and other woodwork in juxtaposition to flush wood doors are specified in Division-6 section "Architectural Woodwork".

Metal door frames for flush wood doors are specified in another Division-8 section.

SUBMITTALS

Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.

Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

For factory-premachined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.

QUALITY ASSURANCE

Quality Standards: Comply with the following standards:

NWWDA Quality Standard: I.S.1 "Industry Standard for Wood Flush Doors", of National Wood Window and Door Association (NWWDA).

AWI Quality Standards: "Architectural Woodwork Quality Standards", including Section 1300 "Architectural Flush Doors", of Architectural Woodwork Institute (AWI) for grade of door, core construction, finish and other requirements exceeding those of NWWDA quality standard.

NWWDA Quality Marking: Mark each wood door with NWWDA Wood Flush Door Certification Hallmark certifying compliance with applicable requirements of NWWDA I.S. 1 Series.

For manufacturers not participating in NWWDA Hallmark Program, a certification of compliance may be substituted for marking of individual doors.

Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152 and which are labeled and listed for ratings indicated by UL, Warnock Hersey or other testing and inspection agency acceptable to authorities having jurisdiction.

Manufacturer: Obtain doors from a single manufacturer.

PRODUCT DELIVERY, STORAGE, AND HANDLING

Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations of NWWDA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.

Identify each door with individual opening numbers which correlate with designation system used on shop drawings for door, frames and hardware, using temporary, removable or concealed markings.

PROJECT CONDITIONS

Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the following requirements applicable to project's geographical location:
Referenced AWI quality standard including Section 100-S-3 "Moisture Content".

Referenced AWI quality standard including Section 100-S-3 "Moisture Content".

WARRANTY

General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced quality standards.

Warranty shall be in effect during following period of time after date of Substantial Completion.

Solid Core Interior Doors:

Life of installation.

Hollow Core Interior Doors:

One year.

Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering door which may be incorporated in the work include, but are not limited to, the following:

Solid Core Doors with Wood Veneer Faces:

Algoma Hardwoods, Inc.
Buell Door Company.
Cal-Wood Door Div., Timberland Industries, Inc.
Chappell Door Company.
Doors, Incorporated.
Eggers Industries, Architectural Door Division.
Gay Doors, Inc.
Glen-Mar Door Mfg. Co.
Graham Manufacturing Corp.
Ipik Door Co., Inc.
Mohawk Flush Doors, Inc.

Weyerhauser Company.

Hollow Core Doors:

Cal-Wood Door Div., Timberland Industries, Inc.
Glen-Mar Door Mfg. Co.
Ipik Door Co., Inc.
Masonite "Legacy".
Weyerhauser Company.

INTERIOR FLUSH WOOD DOORS:

Solid Core Doors for Transparent Finish: Comply with the following requirements:

Faces: Natural birch, plain sliced.

AWI Grade: Economy.

Construction: PC-5 (Particleboard core, 5-ply).

Solid Core Doors for Opaque Finish: Comply with the following requirements:

Faces: Any closed-grain hardwood of mill option.

AWI Grade: Economy.

Construction: PC-5 (Particleboard core, 5-ply).

Fire-Rated Solid Core Doors: Comply with the following requirements:

Faces and AWI Grade: Provide faces and grade to match non-rated doors in same area of building, unless otherwise indicated.

Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated.

Edge Construction: Provide manufacturer's standard laminated edge construction for improved screw-holding capability and split resistance as compared to edges composed of a single layer of treated lumber.

Hollow Core Doors for Opaque Finish: Comply with the following requirements:

Faces: Hardboard.

Hollow core doors shall be "Legacy" design as manufactured by Masonite.

LOUVERS AND LIGHT FRAMES:

Wood Beads for Light Openings in Fire Doors: Manufacturer's standard fire-rated wood-veneer beads matching veneer species of door faces.

FABRICATION

Fabricate flush wood doors to produce doors complying with following requirements:

In sizes indicated for job-site fitting.

Factory-prefit and premachine doors to fit frame opening sizes indicated with the following uniform clearances and bevels:

Comply with tolerance requirements of AWI for prefitting. Comply with final hardware schedules and door frame shop drawings and with hardware templates.

Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory premachining.

Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of doors required.

Light Openings: Trim openings with moldings of material and profile indicated.

SHOP-PRIMING:

Doors for Opaque Finish: Shop prime exposed portions of doors for paint finish with one coat of wood primer specified in Division-9 section "Painting".

Division-9 section "Painting".

FACTORY FINISHING

General: Comply with referenced AWI quality standard including Section 1500 "Factory Finishing".

Prefinish hardboard face, hollow core wood doors at factory.

Opaque Finish: Manufacturer's standard finish system, color and sheen.

Color: Match approved sample for color selected by Architect from manufacturer's standard color.

Sheen: Semi-gloss.

PART 3 - EXECUTION

EXAMINATION

Examine installed door frames prior to hanging door:

Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

Reject doors with defects.

Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION

Hardware: For installation see Division-8 "Finish Hardware" section of these specifications.

Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated.

Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.

Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

Fitting Clearances for Non-Rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.

Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.

Bevel non-rated doors 1/8" in 2" at lock and hinge edges.

Bevel fire-rated doors 1/8" in 2" in lock edge; trim stiles and rails only to extent permitted by labeling agency.

Prefit Doors: Fit to frames for uniform clearance at each edge.

Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at the job site.

Field-Finished Doors: Refer to the following for finishing requirements:
Division-9 section "Painting".

Division-9 Section "Painting".

ADJUSTING AND PROTECTION

Operation: Rehang or replace doors which do not swing or operate freely.

Finished Doors: Refinish or replace doors damaged during installation.

Protect doors as recommended by door manufacturer to assure that wood doors will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 08211

SECTION 08340 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

SUMMARY

Extent of overhead coiling grilles is shown on drawings.

Provide complete operating grille assemblies including curtains, guides, counterbalance mechanisms, hardware, operators and installation accessories, as indicated.

Electrical connections are specified in Division 16.

SUBMITTALS

Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead coiling grille. Include operating instructions and maintenance data.

Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturers product data.

QUALITY ASSURANCE

Provide each overhead coiling grille as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of overhead coiling grille units. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

See concrete and masonry sections of these specifications for installation of inserts and anchorage devices.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Alpine Overhead Doors, Inc.
American Rolling Door Co.
Apton Door, Div. of the Union Corp.
Atlas Door Corp.
The Cookson Company.
Cornell Iron Works, Inc.
Dynaflair Corp.
Dynamic Closures Corp.
Kinnear Div., Harsco Corp.
North American Rolling Door, Inc.
Overhead Door Corp.
Pacific Rolling Door, Inc.
Southwestern Steel Rolling Door Co.
J. G. Wilson Corp.
Windsor Door Div. - The Ceco Corp.

GRILLE CURTAIN

General: Fabricate grille curtain consisting of a network of 5/16" minimum diameter horizontal rods spaced approximately 2" o.c. Interconnect rods by vertical links approximately 5/8" wide, spaced approximately 9" apart and rotating on the rods.

Aluminum Grilles: ASTM B 221, with clear, satin anodized finish.

Bottom Bar: Manufacturer's standard extruded shape or two angles, finished to match grille.

End Locks: Continuous end links or other devices at ends of rods, locking and retaining grille curtain in guides against excessive pressures, maintaining curtain alignment and preventing lateral movement.

Guides: Manufacturer's standard extruded aluminum shape having curtain groove with return lips or bars to retain curtain. Furnish pile strips, rigid vinyl liner, or other nonmetallic inserts to prevent metal-to-metal contact and minimize noise of travel. Furnish removable stops on guides to prevent overtravel of curtain.

COUNTERBALANCING MECHANISM

Counterbalance grille by means of steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel, connected to curtain. Use grease-sealed ball bearings or self-lubricating graphite bearings for rotating members.

Counterbalance: Hot-formed structural quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to support the roll-up curtain without distortion and limit barrel deflection to not more than 0.03" per foot of span under full load.

Furnish spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to barrel and shaft.

Fabricate torsion rod for counterbalance shaft of case-hardened steel, sized to hold fixed spring ends and carry torsional load.

Brackets: Manufacturer's standard design, either cast iron or cold-rolled steel plate.

Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head. Contour to suit end of brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.

Fabricate hoods for aluminum grilles of alloy 3003 aluminum sheet not less than 0.032" thick, finished to match curtain.

ELECTRIC GRILLE OPERATORS

General: Furnish electric operator assembly of size and capacity recommended and provided by grille manufacturer; complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, remote control stations, and control devices.

Provide hand-operated disconnect or mechanism for automatically engaging a sprocket and chain operator and releasing brake for emergency manual operation. Mount disconnect and operator so they are accessible from floor level. Include an interlock device to automatically prevent motor from operating when emergency operator is engaged.

Design operator so that motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

Operator Type: Furnish wall or bracket-mounted operator units consisting of electric motor, worm gear drive from motor to reduction gear box, chain or worm gear drive from reduction box to a gear wheel mounted on counterbalance shaft, and disconnect-

release for manual operation. Provide motor and drive assembly of horsepower and design as determined by manufacturer for size of unit required.

Electric Motors: Provide high-starting torque, reversible, constant duty, Class A insulated electric motors with overload protection, sized to move grille in either direction, from any position, at not less than 2/3' nor more than 1' per second.

Coordinate wiring requirements and current characteristics of motors with building electrical system.

Provide open-drip-proof type motor, and controller with NEMA Type I enclosure.

Remote Control Station: Provide one interior momentary-contact, 3-button control station with push button controls labeled "open", "close" and "stop" and one card actuated remote control station (card actuated remote control station furnished and installed under Section 11150 - Parking Control Equipment.

Provide interior units, lockable, full-guarded type, surface-mounted, heavy-duty, with general purpose NEMA Type 1 enclosure.

Automatic Reverse Control: Provide each grille with automatic safety switch, extending full width of bottom, and located within neoprene or rubber astragal mounted to bottom rail. Contact with switch before fully closing will immediately stop downward travel and reverse direction to fully opened position. Connect to control circuit through retracting safety cord and reel or self-coiling cable.

Provide electrically actuated automatic bottom bar.

PART 3 - EXECUTION

INSTALLATION

Install grilles and operating equipment complete with necessary hardware, in accordance with final shop drawings, manufacturer's instructions, and as specified herein.

Upon completion of installation including work by other trades, lubricate, test and adjust grilles to operate easily, free from warp, twist or distortion.

END OF SECTION 08340

SECTION 08410 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of aluminum entrances and storefronts is indicated on drawings and schedules.

Aluminum entrances and storefront types required for the project include:

Exterior entrance doors.
Frames for exterior entrances.
Storefront type framing system.

Glazing: Refer to "Glass and Glazing" section of Division 8 for glazing requirements for aluminum entrances and storefronts, including doors specified to be factory-preglazed.

SYSTEM DESCRIPTION

Performance Requirements: Provide aluminum entrance and storefront assemblies that comply with specified performance characteristics. Each system shall be tested by a recognized testing laboratory or agency in accordance with specified test methods. Provide certified test results.

Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120 deg. F (67 deg. C), that could cause a metal surface temperature range of 180 deg. F (100 deg. C) within the framing system.

Wind Loading: Provide assemblies capable of withstanding a uniform test pressure of 20 psf inward and 20 psf outward when tested in accordance with ASTM E 330.

Fixed Framing Transmission Characteristics: Provide aluminum entrance and storefront framing system that complies with requirements indicated for transmission characteristics.

Air Infiltration: Provide framing system with an air infiltration rate of not more than 0.06 CFM per sq. ft. of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at an inward test pressure differential of 6.24 psf.

Water Penetration: Provide framing system with no water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf. per sq. ft.

Condensation Resistance: Where framing systems are "thermal-break" construction, provide units tested for thermal performance in accordance with AAMA 1502 showing condensation resistance factor (CRF) of not less than 45.

Thermal Transmittance: Provide framing systems that have an overall U-value of not more than 0.65 BTU/(hr. x sq. ft. x deg. F) at 15 mph exterior wind velocity when tested in accordance with AAMA 1503.

Aluminum Entrance Transmission Characteristics: Provide entrance doors with jamb and head frames that comply with requirements indicated for transmission characteristics.

Air Infiltration: Provide doors with an air infiltration rate of not more than 0.50 CFM for single doors and 1.0 for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.567 psf.

Condensation Resistance: Provide entrance door units tested for thermal performance in accordance with AAMA 1502 showing a condensation resistance factor (CRF) of not less than 48.

Thermal Transmittance: Provide entrance doors that have an overall U-value of not more than 0.93 BTU/(hr. x sq. ft. x deg. F) at 15 mph exterior wind velocity when tested in accordance with AAMA 1503.

SUBMITTALS

Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information:

Fabrication methods.
Finishing.
Hardware.
Accessories.

Shop Drawings: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:

Elevations.
Detail sections of typical composite members.
Hardware, mounting heights.
Anchorages and reinforcements.
Expansion provisions.

Glazing details.

Samples: Submit pairs of samples of each type and color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" square sheets. Where color or texture variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of variations.

Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

QUALITY ASSURANCE

Single Source Responsibility: Provide entrance and storefront produced by a single manufacturer capable of showing prior production of units similar to those required.

Manufacturer's Qualifications: Provide entrances and storefront produced by a single manufacturer with not less than 5 years successful experience in the fabrication of assemblies of the type and quality required.

Installer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5-years successful experience in the installation of systems similar to those required.

Design Criteria: Drawings are based on one manufacturer's entrance and storefront system. Another manufacturer's system of a similar and equivalent nature will be acceptable when, in the Architect's sole judgement, differences do not materially detract from the design concept or intended performance.

PROJECT CONDITIONS

Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work. Where necessary, proceed with fabrication without field measurement, and coordinate fabrication tolerances to ensure proper fit.

PART 2 - PRODUCTS

MANUFACTURERS

Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Amarlite/Arco Metals Co.
Cronstroms Mfg. Inc.

Kawneer Company, Inc.
PPG Industries, Inc.
Tubelite Div., Indal Inc.
United States Aluminum Corp., International Alum. Corp.
United States Metals and Manufacturing Corporation.
Vistawall Architectural Products.

MATERIALS

Aluminum Members: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.

Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.

Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.

Exposed Fasteners: Except where unavoidable for application for hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.

Provide Phillips flat-head machine screws for exposed fasteners.

Concealed Flashing: Provide 26 gage minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

Compression Weatherstripping: Provide the manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

Sliding Weatherstripping: Provide the manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of "Glass and Glazing" section of these specifications.

COMPONENTS

Storefront Framing System: Provide inside-outside matched resilient flush-glazed storefront framing system with provisions for glass replacement. Shop-fabricate and preassemble frame components where possible.

Thermal-Break Construction: Fabricate storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.

Aluminum Door Frames: Fabricate tubular and channel frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards; reinforce as necessary to support required loads.

Stile-and-Rail Type Aluminum Doors:

Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.

Design: Provide 1-3/4" thick doors of design indicated.

Narrow stile (2" nominal width).

Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

HARDWARE

General: Refer to hardware section in Division-8 for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer.

Provide manufacturer's heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.

Ball-Bearing Butts: Provide 5-knuckle, 2-bearings, steel ball bearing butts sized to comply with ANSI A156.1, Grade 1; provide 2 butts for doors 7'-6" or less, 3 for taller doors.

Surface-Mounted Overhead Closers: Provide modern type surface-mounted overhead closers, with cover, for parallel arm type mounting, installation

comply with ANSI A156.4, Grade 1. Comply with manufacturer's recommendations for size of closer, depending on door size, exposure to weather and anticipated frequency of use. Include the following:

Delayed-action closing.

Door Stop: Provide floor or wall mounted door stop, as appropriate, with integral rubber bumper; comply with ANSI A156.16, Grade 1.

Keyed Cylinders: Provide mortise type, 5-pin tumbler, outside cylinder units with cast aluminum face; comply with ANSI A156.5, Grade 1.

Thumb-Turns: Provide inside thumb-turn cylinders of cast aluminum alloy.

Pull Handles: Provide standard aluminum pull handles of style indicated.

Push Bars: Provide the manufacturer's standard full door width single bar push bar.

Thresholds: Provide extruded aluminum threshold of size and design indicated in mill finish, complete with anchors and clips, coordinated with pivots and floor-concealed closers.

FABRICATION

General: Sizes of door and frame units, and profile requirements, are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.

Do not drill and tap for surface-mounted hardware items until time of installation of project site.

Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.

Reinforcing: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.

Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.

Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

Fasteners: Conceal fasteners wherever possible.

Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.

FINISHES

High Performance Organic Coating: Provide NAAMM AA-C12C42R1x coating (cleaned with inhibited chemicals, conversion coated with acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below). Prepare, pretreat and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' instructions.

Fluorocarbon Coating: Provide manufacturer's standard multicoat thermo-cured system, composed of specially formulated primer and fluorocarbon topcoats, complying with AAMA 605.2.

Color: Provide color as selected by Architect from standard choices available from the coating manufacturer.

PART 3 - EXECUTION

INSTALLATION

Comply with manufacturer's instructions and recommendations for installation.

Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place.

Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.

Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealant, fillers, and gaskets.

Refer to "Glass and Glazing" section of Division 8 for installation of glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer.

ADJUSTING

Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

CLEANING

Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

Clean glass surfaces after installation, complying with requirements contained in the "Glass and Glazing" section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

PROTECTION

Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION 08410

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

SUMMARY

Extent of each type, grade and performance class of aluminum window units required is indicated on the drawings and schedules.

Aluminum window units required are commercial grade of the performance class indicated.

Types of aluminum window units required include the following:

Casement windows.
Single-hung windows.
Horizontal sliding windows.
Fixed windows.

Applications of aluminum windows on the project include individual units set in conventional wall construction.

DEFINITIONS

Performance class number included as a part of the window designation system is the actual design pressure in pounds per sq. ft. used to determine the structural test pressure and water test pressure.

Structural test pressure, windload test, is equivalent to 150 percent of the design pressure.

Water leakage resistance test pressure is equivalent to 15 percent of the design pressure with 2.86 psf as a minimum.

SYSTEM DESCRIPTION

Design Requirements: Comply with air infiltration, water penetration and structural performance requirements indicated in AAMA 101-85 for the type, grade and performance class of window units required.

Design wind velocity at the project site is 70 mph.

SUBMITTALS

Shop Drawings: Submit shop drawings for each type of window including information not fully detailed in the manufacturer's standard product data and the following:

Elevations of continuous work at 1/4" scale.
Typical unit elevations at 3/4" scale.
Anchors.
Hardware.
Operators.
Accessories.

Product Data: Submit manufacturer's product specifications, technical product data, recommendations and standard details for each type of aluminum window unit required. Include the following information:

Fabrication methods.
Finishing.
Hardware.
Accessories.

Certification: Provide certification by the manufacturer showing that each type, grade and size of window unit complies with requirements where the manufacturer's standard window units have been tested in accordance with specified tests and meet performance requirements specified. Where such testing has not been accomplished, perform required tests through a recognized testing laboratory or agency and provide certified test results.

QUALITY ASSURANCE

Standards: Requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA 101-85 and applicable general recommendation published by AAMA and AA.

Single Source Responsibility: Provide aluminum windows produced by a single manufacturer capable of showing prior production of units similar to those required.

Design Criteria: The drawings are based on a specific type and model of aluminum window by a single manufacturer. An equivalent type of window by another listed manufacturer may be accepted provided that deviations in dimensions and profiles are minor and do not materially detract from the design concept or intended performances as judged solely by the Architect.

PROJECT CONDITIONS

Field Measurements: Where possible, check actual window openings in construction work by accurate field measurement before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress as directed by the Contractor to avoid delay of work. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit of window units.

PART 2 - PRODUCTS

MANUFACTURERS

Manufacturers: Subject to compliance with requirements, provide products of one of the following:

Casement Windows:

Acorn Building Components, Inc. 4300 Series C-C45.

Single-Hung Windows:

Acorn Building Components, Inc. 3400 Series DH-C45.

Horizontal Sliding Windows:

Acorn Building Components, Inc. 2300 Series HS-C30.

Fixed Windows:

Acorn Building Components, Inc. 257P Series F-C35.

MATERIALS

Aluminum Extrusions: Provide alloy and temper recommended by the window manufacturer for the strength, corrosion-resistance, and application of required finish, but not less than 22,000 psi ultimate tensile strength and not less than 0.062" thickness at any location for main frame and sash members.

Fasteners: Provide aluminum, non-magnetic stainless steel, epoxy adhesive , or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors and other components of window units.

Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce interior with aluminum or non-magnetic stainless steel to

receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match the finish of the member or hardware being fastened, as appropriate.

Anchors, Clips and Window Accessories: Fabricate anchors, clips and window accessories of aluminum, non-magnetic stainless steel or hot-dip zinc coated steel or iron complying with the requirements of ASTM A 386; provide sufficient strength to withstand design pressure indicated.

Compression Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at the manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with AAMA SG-1 or with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

Sliding Type Weatherstripping: Provide woven pile weatherstripping of wool, polypropylene or nylon pile and resin-impregnated backing fabric, and aluminum backing strip. Comply with AAMA 701.2.

Sealant: For sealants required within fabricated window units, provide type recommended by the manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating. Comply with Division-7 "Joint Sealants" section of these specifications for selection and installation of sealants.

Wire Fabric Insect Screen: Provide 18 x 18, 18 x 16, or 18 x 14 mesh of 0.013" diameter coated aluminum wire, complying with FS RR-W-365, Type VII.

WINDOW GRADES AND PERFORMANCE CLASSIFICATION

Commercial Windows: Provide window units complying with requirements of AAMA Grade and Performance Class C30 (min.).

WINDOW TYPES

General: The following paragraphs define the operating arrangement for the types of sash required in window units and specify minimum provisions for each type. The drawings indicate which panels of each window unit are operable sash and which are fixed.

Casement windows are window units containing ventilators that project outward from the plane of the frame and are side hinged or pivoted at the jambs and swing about the vertical axis. Provide sash operation that provides access for cleaning.

Single-hung windows are vertically operating windows in which the weight of the sash is offset by a counterbalancing mechanism mounted in the window.

Horizontal-sliding windows are window units containing one or more horizontally-operable sash in a weathering frame. Provide window units with sash that can be removed from the inside for cleaning.

Fixed windows are window units consisting of a glazed frame installed into one opening and are not operable.

HARDWARE

General: Except to the extent that more specific or stringent requirements are indicated, provide the manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.

Four-bar friction hinges for casement windows shall comply with the requirements of AAMA 904.1.

Friction Shoes: Provide friction shoes of nylon or other non-abrasive, non-staining, non-corrosive, durable material.

Counterbalancing mechanism for single-, double-, or triple- hung windows shall comply with the requirements of AAMA 902.2.

Gear-type rotary operators for awning, casement and jalousie windows shall comply with the requirements of ASTM E 405, Method A, when subjected to the operating moments and closing torques indicated in AAMA 101-85.

Crank-Type Operator: Equip the system with crank-type operator on each gear box shaft, with removable crank. Where necessary, extend the crank shaft with universal joints and support brackets to a suitable crank-mounting location not more than 3'-8" above the floor, with an oil-encased miter gear box.

Window Types:

Casement Windows: Provide the following equipment and operating hardware:

Operating Device: Concealed gear type rotary operator located on the jamb at the sill.

Lock: Lift type cam action lock.

Hinges: Extension hinges or pivots, non-friction type (2 per sash).

Limit Device: Stay bar with an adjustable hold-open device.

Single-Hung Windows: Provide the following equipment and operating hardware:

Sash Balances: Concealed tape spring type balances of size and capacity to hold sash stationary at any open position (2 per sash).

Sash Lock: Cam action sweep lock and keeper on the meeting rail.

Horizontal-Sliding Windows: Provide the following operating equipment and hardware:

Sash Rollers: Adjustable nylon rollers.

Sash Lock: Spring loaded bolt latch at jamb.

Fixed windows are inoperable units. Except for special provisions as indicated for maintenance, cleaning and removal, no operating hardware or equipment is required.

ACCESSORIES

General: Except to the extent that more specific or stringent requirements are indicated, provide the manufacturer's standard accessories that comply with indicated standards.

Insect Screens: Provide insect screen units for each operable exterior sash or vent. Locate screen units on either the inside or outside of the sash, depending upon window type and location shown. Where possible, design window units and hardware to accommodate screens in a tight-fitting removable arrangement, with a minimum of exposed fasteners and latches, and without the necessity of wickets for hardware access. Where wickets are necessary, provide either sliding or hinged type, framed and trimmed for durability during handling, and for a tight fit.

Fabricate screen frames of extruded or formed aluminum tubular-shaped members of 0.040" minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Provide removable PVC spline-anchor concealing the edge of the screen frame. Finish frames to match window units, unless otherwise indicated.

Weatherstripping: Provide sliding-type weatherstripping at locations where sash rails slide horizontally or vertically along the unit frame. Unless otherwise indicated, provide double compression-type weatherstripping at the perimeter of each operating sash where sliding-type weatherstripping is not appropriate.

Provide weatherstripping locked-in to extruded grooves in the sash.

FABRICATION

General: Except to the extent that more specific or stringent requirements are indicated, provide manufacturer's standard fabrication that complies with indicated standards and that produces units that are reglazable without dismantling sash framing. Include a complete system for assembly of components and anchorage of window units, and prepare sash for glazing except where preglazing at the factory is indicated.

Sizes and Profiles: Required sizes for window units and profile requirements are indicated on the drawings. Variable dimensions are indicated along with maximum and minimum dimensions as required to achieve design requirements and coordination with other work.

> Details shown are based upon standard details by one or more manufacturers. Similar details by other manufacturers will be acceptable, provided they comply with size requirements, minimum/maximum profile requirements, and performance standards as indicated or specified.

Thermal-Break Construction: Fabricate aluminum window units with an integrally concealed low conductance thermal barrier, located between exterior materials and window members exposed on the interior, in a manner that eliminates direct metal-to-metal contact. Provide thermal-break construction which has been in use for not less than 3 years, has been tested to demonstrate resistance to thermal conductance and condensation, and has been tested to show adequate strength and security of glass retention.

Provide weepholes and internal water passages to conduct infiltrating water to the exterior.

Provide subframes with anchors for window units where shown, of profile and dimensions indicated but not less than 0.062" thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units.

Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, in the manner indicated.

Glazing Stops: Provide screw-applied or snap-on glazing stops, coordinated with glass selection and glazing system indicated. Finish glazing stops to match window units.

Preglazing Fabrication: Preglaze window units at the factory where possible and practical for applications indicated. Comply with glass and glazing requirements of the "Glass and Glazing" sections of these specifications, and AAMA 101-85. Provide manufacturer's standard insulated glazing but in no case less than 5/8" insulating glass.

FINISHES

Organic Coating: Provide shop-applied organic coating of the type and color indicated or selected by the Architect, tested and certified by the window manufacturer to comply with AAMA 603.6.

Provide the manufacturer's electrolytically applied, white, baked-on acrylic or polyester enamel coating of 1.5 mils dry film thickness. Apply coating over manufacturer's standard substrate preparation including chromate conversion coating.

PART 3 - EXECUTION

INSPECTION

Inspect openings before beginning installation. Verify that rough or masonry opening is correct and the sill plate is level.

Masonry surfaces shall be visibly dry and free of excess mortar, sand and other construction debris.

Metal surfaces shall be dry, clean, free of grease, oil, dirt, rust and corrosion, and welding slag, without sharp edges or offsets at joints.

INSTALLATION

Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators, and other components of the work.

Set units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with the requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.

Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" sections of Division-7 for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.

Compounds, joint fillers and gaskets to be installed after installation of window units are specified as work in another section in Division-7.

ADJUSTING

Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping, for smooth operation and a weathertight closure.

CLEANING

Clean aluminum surfaces promptly after installation of windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt and other substances. Lubricate hardware and other moving parts.

Clean glass of preglazed units promptly after installation of windows; comply with requirements of the "Glass and Glazing" section for cleaning and maintenance.

PROTECTION

Initiate and maintain protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of substential completion.

END OF SECTION 08520

SECTION 08710 - FINISH HARDWARE

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

DESCRIPTION OF WORK

Definition: "Builders' Hardware" includes items known commercially as builders hardware which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

Extent of finish hardware required is indicated on drawings and in schedules.

Types of finish hardware required include the following:

Hinges
Spring hinges
Lock cylinders and keys
Lock and latch sets
Bolts
Push/pull units
Bi-fold door hardware
Closers
Door trim units
Protection plates
Weatherstripping for exterior doors
Thresholds

Silencers included integral with hollow metal frames are specified with door frames elsewhere in Division-8.

Weatherstripping included integral with hollow metal frames are specified with door frames elsewhere in Division-8.

Thresholds for aluminum entrance doors are specified with entrance doors elsewhere in Division-8.

Expansion joints acting as thresholds are specified in Division-5.

Finished hardware for aluminum entrance doors is specified elsewhere in Division-8.

QUALITY ASSURANCE

Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from only one manufacturer, although several may be indicated as offering products complying with requirements.

Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels.

SUBMITTALS

Product Data: Submit manufacturers technical product data for each item of hardware in accordance with Division-1 section "Submittals". Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and finish.

Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.

Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

Type, style, function, size and finish of each hardware item.

Name and manufacturer of each item.

Fastenings and other pertinent information.

Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.

Explanation of all abbreviations, symbols, codes, etc. contained in schedule.

Mounting locations for hardware.

Door and frame sizes and materials.

Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish

hardware. and other information essential to the coordinated review of hardware schedule.

Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

PRODUCT HANDLING

Tag each item or package separately, with identification related to final hardware schedule, and include basic installation instructions with each item or package.

Packaging of hardware, is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

Inventory hardware jointly with representatives of the hardware supplier and the hardware installer until each is satisfied that the count is correct.

Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

PART 2 - PRODUCTS

SCHEDULED HARDWARE

Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware is indicated in the Finish Hardware Data Sheet and Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers of the following.

Manufacturer's product designations: One or more manufacturers are listed for each hardware type required. An asterisk (*) after a manufacturer's name indicates whose product designation is used in the Hardware Schedule for purposes of establishing minimum requirements. Provide either the product

designated, or, where more than one manufacturer is listed, the comparable product of one of the other manufacturers which comply with requirements including those specified elsewhere in this section.

MATERIALS AND FABRICATION

General:

Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for the applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of the type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on the opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

HINGES, BUTTS AND PIVOTS:

Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.

Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

Steel Hinges: Steel pins.

Non-ferrous Hinges: Stainless steel pins.

Exterior Doors: Non-removable pins.

Interior Doors: Non-rising pins.

Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.

Number of hinges: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.

LOCK CYLINDERS AND KEYING

General: Supplier will meet with Owner to finalize keying requirements and obtain final instructions in writing.

Standard System: Except as otherwise indicated, provide new masterkey system for project.

Equip locks with manufacturer's standard 6-pin tumbler cylinders.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Hardware Division, Emhart Industries, Inc.
Medeco Security Locks, Inc.
Sargent and Company, Div. Walter Kidde & Co.

Metals: Construct lock cylinder parts from brass/bronze, stainless steel or nickel silver.

Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.

Permanently inscribe each key with number or lock that identifies cylinder manufacturer key symbol, and notation "DO NOT DUPLICATE".

Key Material: Provide keys of nickel silver only.

Key Quantity: Furnish 3 change keys for each lock; 5 master keys for each master system; and 5 grandmaster keys for each grandmaster system.

Deliver keys to Owner's representative.

LOCKS, LATCHES AND BOLTS

Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.

Provide standard (open) strike plates for interior doors of residential units where wood door frames are used.

Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.

Lock Throw: Provide 5/8" minimum throw of latch and deadbolt used on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

Provide 1/2" minimum throw on other latch and deadlock bolts.

Flush Bolt Heads: Minimum of 1/2" diameter rods of brass, bronze or stainless steel, with minimum 12" long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.

PUSH/PULL UNITS

Exposed Fasteners: Provide manufacturer's standard exposed fasteners for installation; through-bolted for matched pairs, but not for single units.

CLOSERS AND DOOR CONTROL DEVICES

Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.

Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.

Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A 117.1 provisions for door opening force and delayed action closing.

DOOR TRIM UNITS

Fasteners: Provide manufacturer's standard exposed fasteners for door trim units (kick plates, edge trim, viewers, knockers, mail drops and similar units); either machine screws of self-tapping screw.

Fabricate edge trim of stainless steel, not more than 1/2" nor less than 1/16" smaller in length than door dimension.

Fabricate protection plates (armor, kick or mop) not more than 1- 1/2" less than door width on stop side and not more than 1/2" less than door width on pull side, x the height indicated.

Metal Plates: Stainless steel, .050" (U.S. 18 ga.).

HARDWARE FOR BI-FOLD DOORS

General: Provide manufacturer's standard hardware for interior bi-fold doors which are not furnished as a "package" complete with hardware.

Operating Hardware: Provide manufacturer's complete sets, consisting of overhead extruded aluminum track, captive nylon shoe or roller guides, rubber bumpers in truck, adjustable pivots, hinges and door aligners; all designed to accommodate the number, size, thickness and weight of door leaves indicated.

Provide light duty sets, designed for leaves weighing up to 25 lbs. per door.

Trim Hardware: Provide items as follows as needed for operating bi-fold doors:

Pulls: Manufacturer's standard pull, one per pair of leaves.

WEATHERSTRIPPING

General: Except as otherwise indicated, provide continuous weatherstripping at each edge of every exterior door leaf. Provide type, sizes and profiles shown or scheduled. Provide non-corrosive fasteners as recommended by manufacturer for application indicated.

Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

Weatherstripping at Jambs and Heads:

Provide bumper-type resilient insert and metal retainer strips, surface-applied unless shown as mortised or semi-mortised, of following metal, finish and resilient bumper material:

Flexible, hollow neoprene bulb or loop insert, conforming to MIL R 6055, Class II, Grade 40.

Flexible bulb or loop insert of vinyl, conforming to MIL R 6055, Class II, Grade 40.

Brush pile insert of polypropylene or nylon woven pile and aluminum strip backing, complying with AAMA 701.2.

Weatherstripping at Door Bottoms:

Provide threshold consisting of contact type resilient insert and metal housing of design and size shown; of following metal, finish, and resilient seal strip:

Extruded aluminum with natural anodized finish; 0.062" minimum thickness of main walls and flanges.

Flexible vinyl wiper or sweep seal strip complying with CS 230-60.

THRESHOLDS

General. Except as otherwise indicated provide standard metal threshold unit of type, size and profile as shown or scheduled.

Exterior Hinged/Pivoted Doors: Provide units not less than 4" wide, formed to accommodate change in floor elevation where indicated, fabricated to accommodate door hardware and to fit door frames, and as follows:

For in-swinging doors provide units with interlocking lip and interior drain channel; include hook on bottom edge of door and drain pan.

For outswinging doors provide units with interlocking lip and with hook on bottom edge of door to act as weather bar.

For out-swinging doors provide rabbeted type units with replaceable weatherstrip insert in stop.

HARDWARE FINISHES

Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch-lock sets) for color and texture.

Provide finishes which match those established by BHMA or, if none established, match the Architect's sample.

Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified for the applicable units of hardware by referenced standards.

Provide protective lacquer coating on all exposed hardware finishes of brass, bronze and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer".

The designations used in schedules and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted.

PART 3 - EXECUTION

INSTALLATION

Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.

Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.

Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

ADJUST AND CLEAN

Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

Clean adjacent surfaces soiled by hardware installation.

Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

END OF SECTION 08710

SECTION 08800 - GLASS AND GLAZING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent of glass and glazing work is indicated on drawings and schedules.

Types of work in this section include glass and glazing for:

Window units, not indicated as "preglazed".

Storefront construction.

Entrances and other doors, not indicated as "preglazed".

Mirror glass is specified in Division-10.

SYSTEM DESCRIPTION

Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading and impact loading (where applicable), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.

Normal thermal movement is defined as that resulting from an ambient temperature range of 120 deg. F (67 deg. C) and from a consequent temperature range within glass and glass framing members of 180 deg. F (100 deg. C).

Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating, if any, resulting from seal failure, and any other visual evidence of seal failure or performance.

SUBMITTALS

Product Data: Submit manufacturer's technical data for each glazing material and fabrication glass product required, including installation and maintenance instructions.

Certificate: Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

> Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.

Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

QUALITY ASSURANCE

Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.

Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component pane of units with appropriate certification label of inspecting and testing organization indicated below:

> Insulating Glass Certification Council (IGCC).
>
> Associated Laboratories, Inc. (ALI).

Single Source Responsibility For Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

DELIVERY, STORAGE, AND HANDLING

Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

PROJECT CONDITIONS

Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

Install liquid sealants at ambient and substrate temperatures above 40 deg. F (4.4 deg. C).

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include; but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products of one of the following:

Manufacturers of Clear and Tinted Float Glass:

AFG Industries, Inc.
Ford Glass Division.
Guardian Industries Corp.
LOF Glass, Inc.
PPG Industries, Inc.
Saint-Gobain/Euroglass.

Manufacturers of Heat-Treated Glass:

AFG Industries, Inc.
Cardinal IG.
Environmental Glass Products.
Falconer Glass Industries.
Ford Glass Division.
Guardian Industries Corp.
Hordis Brothers, Inc.

LOF Glass, Inc.
PPG Industries, Inc.
Saint-Gobain/Euroglass.
Spectrum Glass Prod. Div., H.H. Robertson Co.
Viracon, Inc.

Manufacturers of Insulating Glass:

Advanced Coating Technology.
AFG Industries, Inc.
Cardinal IG.
Environmental Glass Products.
Falconer Glass Industries.
Ford Glass Division.
Guardian Industries Corp.
Hordis Brothers, Inc.
Independent Insulating Glass.
PPG Industries, Inc.
Spectrum Glass Prod. Div., H.H. Robertson Co.
Viracon, Inc.

GLASS PRODUCTS, GENERAL

Primary Glass Standard: Provide primary glass which complies with ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and if applicable, form, finish, mesh and pattern.

Heat-Treated Glass Standard: Provide heat-treated glass which complies with ASTM C 1048 requirements, including those indicated by reference to kind, condition, type, quality, class, and, if applicable, form, finish, and pattern.

Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

PRIMARY GLASS PRODUCTS

Clear Float Glass: Type I, (transparent glass, flat), Class 1, Quality q3 (glazing select).

HEAT-TREATED GLASS PRODUCTS

Manufacturing Process: Manufacture heat-treated glass by either (at supplier's option):

By horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated.

By vertical (tong-held) or horizontal (roller hearth) process, at manufacturer's option, except provide horizontal process where indicated as "tongless" or "free of tong marks".

Uncoated Clear Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind as indicated below.

Kind FT (fully tempered) where indicated.

SEALED INSULATING GLASS UNITS

General: Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E 774 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and dessicant.

For properties of individual glass panes making up units, refer to product requirements specified elsewhere in this section applicable to types, classes, kinds and conditions of glass products indicated.

Provide heat-treated panes of kind and at locations indicated or, if not indicated, provide heat-strengthened panes where recommended by manufacturer for application indicated and tempered where indicated or where safety glass is designated or required.

Performance Classification per ASTM E 774: Class A.

Thickness of Each Pane: 1/8" for 5/8" overall thickness units. 3/16" for 3/4" overall thickness units. 1/4" for 1" overall thickness units.

Air Space Thickness: 3/8" for 5/8" and 3/4" overall thickness units. 1/2" for 1" overall thickness units.

Sealing System: Manufacturer's standard.
Spacer Material: Manufacturer's standard metal.

Dessicant: Manufacturer's standard; either molecular sieve or silica gel or blend of both.

Corner Construction: Manufacturer's standard corner construction.

Uncoated Insulating Glass Units: Manufacturer's standard units complying with the following requirements:

Exterior Pane: Clear float glass.

Kind: As indicated.

Interior Pane of Glass: Clear float glass.

Kind: As indicated.

ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES

General: Provide products of type indicated and complying with the following requirements:

Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for applications indicated and conditions at time of installation.

Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.

Colors: Provide color of exposed sealants indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

Two-Part Polysulfide Glazing Sealant: Type M; Grade NS; Class 25; Uses NT, M, G, A and, as applicable to uses indicated, O.

One-Part Acid-Curing Silicone Glazing Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to uses indicated, O.

One-Part Non-Acid-Curing Silicone Glazing Sealant: Type S; Grade NS, Class 25; Uses NT, G, A, and, as applicable to uses indicated, O; and complying with the following requirements for modulus and additional joint movement capability.

Medium Modulus: Tensile strength of not less than 45 nor more than 75 psi at 100 percent elongation when tested per ASTM D 412 after 14 days at 77 deg. F (20 deg. C) and 50 percent relative humidity.

Additional capability, when tested per ASTM C 719 for adhesion and cohesion under maximum cyclic movement, to withstand the following percentage

increase and decrease of joint width, as measured at time of application, and remain in compliance with other requirements of ASTM C 920.

50 percent.

Preformed Butyl-Polyisobutylene Glazing Tape: Provide manufacturer's standard solvent-free butyl-polyisobutylene formulation with a solids content of 100 percent; complying with AAMA A 804.1; in extruded tape form; non-staining and non-migrating in contact with nonporous surfaces; packaged on rolls with a release paper on one side; with or without continuous spacer rod as recommended by manufacturers of tape and glass for application indicated.

Available Products: Subject to compliance with requirements, glazing sealants which may be incorporated in the work include, but are not limited to, the following:

Two-Part Polysulfide Glazing Sealant:

"Chem-Calk 200"; Bostik Construction Products Div.
"Synthecalk GC-5"; Pecora Corp.

One-Part Acid-Curing Silicone Glazing Sealant:

"Chem-Calk 1200"; Bostik Construction Products Div.
"Dow Corning 999"; Dow Corning Corp.
"SCS 1200"; General Electric Corp.
"863"; Pecora Corp.
"Rhodorsil 3B"; Rhone-Poulenc Inc.
"Omniglaze"; Sonneborn Building Products Div.; Rexnord Chemical Products Inc.
"Proglaze"; Tremco.

One-Part Non-Acid Curing Medium- Modulus Silicone Glazing Sealant:

"Dow-Corning 795"; Dow Corning Corp.
"Silpruf"; General Electric Corp.
"Gesil"; General Electric Corp.
"Spectrum 2"; Tremco, Inc.

One-Part Non-Acid Curing Low-Modulus Silicone Glazing Sealant:

"Chem-Calk 1000"; Bostik Construction Products Div.
"Dow Corning 790"; Dow Corning Corp.
"864"; Pecora Corp.
"Omniseal"; Sonneborn Building Products Div., Rexnord Chemical Products Inc.
"Spectrum 1"; Tremco, Inc.

Preformed Butyl- Polyisobutylene Glazing Tape Without Spacer Rod:

"Chem-Tape 40"; Bostik Construction Products Div.
"Extru-Seal"; Pecora Corp.
"PTI 303"; Glazing Tape; Protective Treatments, Inc.
"Tremco 440 Tape"; Tremco Inc.

Preformed Butyl-Polyisobutylene Glazing Tape With Spacer Rod:

"Chem-Tape 60"; Bostik Construction Products Div.
"Shim-Seal"; Pecora Corp.
"PTI 303" Shim Tape; Protective Treatments, Inc.
"Pre-shimmed Tremco 440 Tape"; Tremco Inc.

GLAZING GASKETS

Cellular Elastomeric Preformed Gaskets: Extruded or molded closed cell, integral-skinned neoprene of profile and hardness required to maintain watertight seal; complying with ASTM C 509, Type II; black.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Manufacturers of Preformed Gaskets:

D.S. Brown Co.
Maloney Precision Products Co.
Tremco.

MISCELLANEOUS GLAZING MATERIAL

Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.

Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.

Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.

Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.

Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

PART 3 - EXECUTION

EXAMINATION

Require Glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

PREPARATION

Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

GLAZING, GENERAL

Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.

Glazing channel dimensions as indicated in details are intended to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.

Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

GLAZING

Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6" from corner unless

otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.

Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.

Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.

Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

Tool exposed surfaces of sealants to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.

Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement.

Miter cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

PROTECTION AND CLEANING

Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a

month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Wash glass by method recommended by glass manufacturer.

END OF SECTION 08800

SECTION 09250 - GYPSUM DRYWALL

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

SUMMARY

Extent of each type of gypsum drywall construction required is indicated on Drawings:

This Section includes the following types of gypsum board construction:

Steel framing members to receive gypsum drywall and gypsum sheathing.

Gypsum board screw-attached to steel framing and furring members.

Glass mesh mortar units for application of tile.

DEFINITIONS

Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this section or other referenced standards.

SUBMITTALS

Product data from manufacturers for each type of product specified.

QUALITY ASSURANCE

Fire-Resistance Ratings: Where indicated, provide materials and construction which are identical to those of assemblies whose fire resistance rating has been determined per ASTM E 119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

Provide fire-resistance-rated assemblies, identical to those indicated by reference to GA File Nos. in GA-600 "Fire Resistance Design Manual" or to design designations in U.L. "Fire Resistance Directory" or in listing of other testing and agencies acceptable to authorities having jurisdiction.

Single-Source Responsibility: Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.

DELIVERY, STORAGE, AND HANDLING

Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

Handle gypsum boards to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metal corner beads and trim.

PROJECT CONDITIONS

Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.

Minimum Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F (4 deg C). For adhesive attachment and finishing of gypsum board maintain not less than 50 deg F (10 deg C) for 48 hours prior to application and continuously thereafter until drying is complete.

Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

Steel Framing and Furring:

Bostwick Steel Framing Co.
Dale Industries, Inc.
Gold Bond Building Products Div., National Gypsum Co.
Incor, Inc.
Marino Industries Corp.
United States Gypsum Co.

Gypsum Boards and Related Products:

Centex American Gypsum Co.
Domtar Gypsum Co.
Georgia-Pacific Corp.
Gold Bond Building Products Div., National Gypsum Co.
United States Gypsum Co.

STEEL FRAMING FOR WALLS AND PARTITIONS

Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 deg and doubled over to form 3/16" minimum lip (return) and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

Thickness: As indicated.

Depth: As indicated.

Steel Rigid Furring Channels: ASTM C 645, hat-shaped, depth and minimum thickness of base (uncoated) metal as follows:

Depth: As indicated.

Thickness: As indicated.

Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 0.0329 inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.

Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, complying with ASTM C 645 for base metal, finish and widths of face and fastening flange, fabricated to form 1/2 inch deep channel of the following configuration:

Single-Leg Configuration: Assymetric-shaped channel with face connected to a single flange by a single slotted leg (web).

Double-Leg Configuration: Hat-shaped channel, with 1-1/2 inch wide face connected to flanges by double slotted or expanded metal legs (webs).

Configuration: Either one indicated above.

Z-Furring Members: Manufacturer's standard zee-shaped furring members with slotted or nonslotted web, fabricated from hot-dip galvanized steel sheet complying with ASTM A 525, Coating Designation G60; with a minimum base metal (uncoated) thickness of

0.0179 inch, face flange of 1-1/4 inch, wall-attachment flange of 7/8 inch, and of depth required to fit insulation thickness indicated.

Fasteners: Provide fasteners of type, material, size, corrosion resistance, holding power and other properties required to fasten steel framing and furring power members securely to substrates involved; complying with the recommendations of gypsum drywall manufacturers for applications indicated.

GYPSUM DRYWALL

General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end joints.

Thickness: Provide gypsum board in thicknesses indicated, or if not otherwise indicated, in 1/2 inch thicknesses to comply with ASTM C 840 for application system and support spacing indicated.

Gypsum Wallboard: ASTM C 36, and as follows:

Type: Regular, unless otherwise indicated.

Edges: Tapered.

Thickness: 5/8", unless otherwise indicated.

Moisture Resistant Gypsum Wallboard: ASTM C 630, and as follows:

Type: Regular, unless otherwise indicated.

Thickness: 5/8", unless otherwise indicated.

GLASS MESH MORTAR UNITS

Proprietary backing units with glass mesh fiber mesh reinforcing and water resistant coating on both faces, complying with the following requirements:

Cement-Coated Portland Cement Panels: High density portland cement surface coating on both faces and lightweight concrete core composed of portland cement and expanded ceramic aggregate; fabricated in panels 7/16 inch thick by 36 inches wide by 60 inches long; and weighing 3.2-3.8 lbs per sq. ft.

Products: Subject to compliance with requirements, provide one of the following products:

"Wonder-Board"; Modulars Inc.

GYPSUM SHEATHING

Gypsum Sheathing Standards: Provide gypsum sheathing board complying with FS SS-L-30 for Type II (sheathing), Class 2 (water-resistant surfaces), Form a (plain back), Grade (core) and Style indicated below; and with ASTM C 79.

Grade W: Water-resistant treated core.

Style: Square edges and ends.

Thickness: 5/8".

Size: 4'-0" x 8'-0" or 9'-0" as required for coordination with framing.

TRIM ACCESSORIES

Corner bead and Edge Trim for Interior Installation: Provide corner beads, edge trim and control joints which comply with ASTM C 1047 and requirements indicated below:

Material: Formed metal, plastic or metal combined with paper, with metal complying with the following requirements:

Sheet steel zinc-coated by hot-dip process.

Edge trim shapes indicated below by reference to designations of Fig. 1 in ASTM C 1047:

"LC" Bead, unless otherwise indicated.

"LK" Bead with square nose for use with kerfed joints.

"L" Bead where indicated.

"U" Bead where indicated.

One-Piece Control Joints: Formed with vee-shaped slot per Fig. 1 in ASTM C 1047, with slot opening covered with removable strip:

Metal Corner Bead and Edge Trim for Exterior Ceilings: Comply with the following requirements:

Edge trim complying with ASTM C 1047, formed from rolled zinc, shape "LC" Bead per Fig. 1 unless otherwise indicated.

GYPSUM BOARD JOINT TREATMENT MATERIALS

General: Provide materials complying with ASTM C 475, ASTM C 840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.

Joint Tape: Paper reinforcing tape, unless otherwise indicated.

Drying-Type Joint Compounds: Factory-prepackaged vinyl-based products complying with the following requirements for formulation and intended use.

Ready-Mix Formulation: Factory-premixed product.

Taping compound formulated for embedding tape and for first coat over fasteners and flanges of corner beads and edge trim.

Topping compound formulated for fill (second) and finish (third) coats.

MISCELLANEOUS MATERIALS

General: Provide auxiliary materials for gypsum drywall construction which comply with referenced standards and the recommendations of the manufacturer of the gypsum board.

Spot Grout: ASTM C 475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

Gypsum Board Screws: ASTM C 1002.

Concealed Acoustical Sealant: Nondrying, nonhardening, nonskinning, nonstaining, nonbleeding, gunnable sealant complying with requirement specified in Division-7 section "Joint Sealers."

Sound Attenuation Blankets: Unfaced mineral fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing); and as follows:

Mineral Fiber Type: Fibers manufactured from glass or slag.

PART 3 - EXECUTION

EXAMINATION

Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for

compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

PREPARATION

Ceiling Anchorages: Coordinate installation of ceiling suspension system with installation of overhead structural system to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.

Before sprayed-on fireproofing is applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed-on fireproofing. Where offset anchor plates are required provide continuous units fastened to building structure not more than 24 inches o.c. and to ceiling runners.

After sprayed-on fireproofing has been applied, remove only as much fireproofing as needed to complete installation of drywall construction. Protect fireproofing that remains from damage.

INSTALLATION OF STEEL FRAMING, GENERAL

Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

Install supplementary framing, blocking and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer, or if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.

Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details shown on Drawings:

Where edges of suspended ceilings abut building structure horizontally at ceiling perimeters or penetration of structural elements.

Where partitions and wall framing abuts overhead structure.

Provide slip or cushioned type joints as detailed to attain lateral support and avoid axial loading.

Do not bridge building expansion and control joints with steel framing or furring members; independently frame both sides of joints with framing or furring members or as indicated.

INSTALLATION OF STEEL FRAMING FOR WALLS AND PARTITIONS

Install runners (tracks) at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other construction.

Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.

Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

Install steel studs and furring in sizes and at spacings indicated but not less than that required by referenced steel framing installation standard.

Install steel studs so that flanges point in the same direction and gypsum boards can be installed in the direction opposite to that of the flange.

Frame door openings to comply with detailed indicated, with GA-219 and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

Frame openings other than door openings to comply with details indicated or if none indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.

Install thermal insulation as follows:

Erect insulation vertically and hold in place with Z-furring members spaced 24 inches on center.

Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches on center.

At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

APPLICATION AND FINISHING OF GYPSUM BOARD, GENERAL

Gypsum Board Application and Finishing Standard: Install and finish gypsum board to comply with ASTM C 840.

Install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed.

Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches in alternate courses of board.

Install wall/partition boards in manner which minimizes the number of end-butt joints or avoids them entirely where possible. At stairwells and similar high walls, install board horizontally with end joints staggered over studs.

Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

Locate either edge or end joints over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

Attach gypsum board to steel studs so that leading edge or end of each board is attached to open (unsupported) edge of stud flange first.

Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

Spot grout hollow metal door frames for solid core wood doors, hollow metal doors and doors over 32 inches wide. Apply spot grout at each jamb anchor clip just before inserting board into frame.

Form control joints and expansion joints at locations indicated, with space between edges of boards, prepared to receive trim accessories.

Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are properly braced internally.

Except where concealed application is required for sound, fire, air or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. area, and may be limited to not less than 75 percent of full coverage.

Fit gypsum board around ducts, pipes, and conduits.

Where partitions intersect open concrete coffers, cut gypsum board to fit profile of coffers and allow 1/4 to 1/2 inch wide joint for sealant.

Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4" to 1/2" space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.

Where sound-rated drywall construction work is indicated, seal construction at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim, and close off sound-flanking paths around or through construction including sealing of partitions above acoustical ceilings.

Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

METHODS OF GYPSUM BOARD APPLICATION

Single-Layer Application: Install gypsum wallboard as follows.

On partitions/walls apply gypsum board vertically (parallel to framing), unless otherwise indicated, and provide sheet lengths which will minimize end joints.

On partitions/walls 8'-1" or less in height apply gypsum board horizontally (perpendicular to framing); use maximum length sheets possible to minimize end joints.

On Z-furring members apply gypsum board vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

Wall Tile Base: Install glass mesh mortar units as base for thin-set ceramic wall tile and similar rigid applied wall finishes. Treat joints to comply with manufacturer's recommendations for type of application indicated.

Single-Layer Fastening Methods: Apply gypsum boards to supports as follows:

Fasten with screws.

Exterior Soffits and Ceilings: Apply exterior gypsum soffit board perpendicular to supports, with end joints staggered over supports. Install with 1/4 inch open space where boards abut other construction.

Fasten with cadmium-plated screws, or with galvanized or aluminum nails where supports are nailable.

GYPSUM WALL SHEATHING

General: Provide gypsum board sheathing where shown. Fasten to exterior face of stud framing for exterior walls. Use 1-1/2" long, 11 gage galvanized roofing nails with 3/8"

head or 15 gage, divergent point galvanized staples 1/2" wide x 1-1/2" long. Keep perimeter fasteners 3/8" from edges and ends of board units. Fit boards tightly against each other and around openings.

Install 4' x 8' or longer sheathing vertically with long edges parallel to and centered over studs. Provide solid wood blocking wherever end joints do not bear against framing sills or plates. Nail or staple to each support in accordance with manufacturer's recommended spacing, but space fasteners not more than 4" o.c. around perimeter at edge and end supports and 8" o.c. at intermediate supports.

INSTALLATION OF DRYWALL TRIM ACCESSORIES

General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

Install corner Beads at external corners.

Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where "U-bead" (semi-finishing type) is indicated.

Install "LC" bead where drywall construction is tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

Install "LK" bead where substrate is kerfed to receive long flange of trim.

Install "L" bead where edge trim can only be installed after gypsum board is installed.

Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

Install U-bead where indicated, and where exterior gypsum board edges are not covered by applied moldings or indicated to receive edge trim with face flanges covered with joint compound.

Install plastic edge trim where indicated on wall panels at juncture with ceilings.

Install control joints at locations indicated, or if not indicated at spacings and locations required by referenced gypsum board application and finish standard, and approved by the Architect for visual effect.

FINISHING OF DRYWALL

General: Apply joint treatment at gypsum board joints (both directions), flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects and elsewhere as required to prepare work for decoration.

Prefill open joints and rounded or beveled edges, if any, using setting-type joint compound.

Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.

Finish interior gypsum wallboard by applying the following joint compounds in 3 coats (not including prefill of openings in base), and sand between coats and after last coat:

Embedding and First Coat: Ready-mix drying-type all-purpose or taping compound.
Fill (Second) Coat: Ready-mix drying-type all-purpose or topping compound.
Finish (Third) Coat: Ready-mix drying-type all-purpose or topping compound.

Finish exterior gypsum soffit board by using setting-type joint compounds to prefill joints, embed tape, and to apply first, fill (second) and finish (third) coats; smooth each coat before joint compound hardens to minimize need for sanding; sand between coats and after finish coat.

Painting of exterior gypsum soffit board after finish coat has dried is specified in Division-9 Section "Painting."

PROTECTION

Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

END OF SECTION 09250

SECTION 09270 - GYPSUM BOARD SHAFT WALL SYSTEMS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This section includes the following applications for gypsum board shaft wall systems:

Elevator shaft enclosures.

Stairwell enclosures.

Gypsum drywall construction for applications other than shaft walls is specified in Division 9 Section "Gypsum Drywall."

Application and finishing of gypsum wallboard is specified by reference to Division 9 Section "Gypsum Drywall."

DEFINITIONS

Gypsum board shaft wall systems are pretested assemblies of gypsum boards and metal components designed for erection from room-side of shaft.

Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this section or other referenced standards.

SYSTEM DESCRIPTION

Performance Requirements, General: Provide gypsum board shaft wall systems complying with performance requirements specified, as demonstrated by pretesting manufacturer's corresponding stock systems.

Fire-Resistance Ratings: Where indicated, provide materials and construction which are identical to those of assemblies, including those incorporating elevator door and other framing, whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

Structural Performance Characteristics: Provide gypsum board shaft wall systems engineered to withstand the following lateral design loadings (air pressures), applied

transiently and cyclically, for maximum heights of partitions required, within the following deflection limits, verified by pretesting for deflection characteristics:

Lateral Loading: 5 psf.
Deflection Limit: 1/120 of partition height.

Sound Attenuation Performance: Provide gypsum board shaft wall systems designed and pretested to achieve the following minimum ratings for sound transmission class (STC) per ASTM E 90.

STC Rating: 47.

SUBMITTALS

Product data from manufacturers for each type of gypsum board shaft wall system specified.

Product test reports indicating and interpreting test results relative to compliance of gypsum board shaft wall systems with fire resistance, structural performance and acoustical performance requirements.

Research reports or evaluation reports of the the model code organization acceptable to authorities having jurisdiction which evidence system's compliance with requirements and with building code in effect for Project.

QUALITY ASSURANCE

Single Source Responsibility: Obtain products for gypsum board shaft wall systems from a single manufacturer for each type of system indicated.

DELIVERY, STORAGE, AND HANDLING

Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

Handle gypsum boards to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metal corner beads, trim, track, and studs.

PROJECT CONDITIONS

Comply with requirements for environmental conditions, room temperatures and ventilation specified in the following Division 9 Section:

"Gypsum Drywall."

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

Domtar Gypsum Co.
Georgia Pacific Corporation.
Gold Bond Building Products Div., National Gypsum Co.
United States Gypsum Co.

BASIC SYSTEM MATERIALS

General: Provide standard materials and components listed in manufacturer's published product literature for gypsum board shaft wall systems of type and application indicated.

Provide gypsum boards in maximum lengths available to eliminate or minimize end-to-end butt joints and in thickness required to produce assemblies complying with structural and other performance requirements.

Steel Framing: ASTM C 645, of profile, size, and base metal thickness required to produce assemblies complying with structural performance requirements, with sectional properties computed to conform with AISI "Specification for Design of Cold-Formed Steel Structural Members."

Gypsum Shaftwall Board: ASTM C 442, Type X liner panel or coreboard designed for shaft wall construction, with moisture-resistant paper facings.

Gypsum Wallboard: ASTM C 36, Type X, and as follows:

Edges: Tapered.

Gypsum Backing Board for Multi-Layer Applications: ASTM C 442 or, where backing board is not available from manufacturer, gypsum wallboard, ASTM C 36, Type X, edge configuration as standard with manufacturer.

Trim Accessories: Provide cornerbeads, edge trim and control joints of material and, for edge trim, shapes specified in Division 9 section referenced below and complying with ASTM C 1047 and gypsum board shaft wall manufacturer's recommendation for application indicated.

"Gypsum Drywall."

Gypsum Wallboard Joint Treatment Materials: Provide materials complying with ASTM C 475, ASTM C 840, recommendations of gypsum board shaft wall manufacturer for the application indicated, and as specified in Division 9 Section "Gypsum Drywall."

Miscellaneous Materials: Provide auxiliary materials for gypsum board shaft wall systems of the type and grade recommended by the manufacturer of the system and as follows:

Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum boards of type indicated.

Gypsum Board Screws: ASTM C 1002.

Runner Fasteners: Low-velocity tool-driven fasteners of type, size and material required to withstand loading conditions imposed on shaft wall system without exceeding allowable design stress of runner, fastener or structural substrate in which anchor is embedded.

Concealed Acoustical Sealant: Nondrying, nonhardening, nonskinning, nonstaining, gunnable synthetic rubber sealant complying with requirements specified in Division 7 Section "Joint Sealers."

Spot Grout: ASTM C 475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

Sound Attenuation Blankets: Unfaced mineral fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing); and as follows:

Mineral Fiber Type: Fibers manufactured from glass or slag.

BASIC SYSTEM DESCRIPTION

General: Characteristics of selected components are described below for purposes of indicating discrete gypsum board shaft wall systems which are manufacturers' standard assemblies. Provide complete shaft wall systems which comply with requirements indicated.

Cavity Shaft Wall Systems: Provide assemblies consisting of gypsum shaft wall boards inserted between U- or J-shaped metal floor and ceiling tracks; with specially shaped studs engaged in tracks and fitted between shaftwall boards; and gypsum boards on finished side or sides applied to studs in number of layers, thicknesses and arrangement indicated.

Shaftwall Board Thickness: Not less than 3/4 inch.

Stud Shape: I, C-H or double E.

Stud Thickness: As indicated.

Stud Depth: As indicated.

Room-Side Finish: One layer 5/8 inch thick gypsum board.

Shaft-Side Finish: One layer of gypsum board of thickness indicated below; provide only where finish is indicated on shaft side as well as room side, otherwise leave exposed.

Thickness: 5/8 inch.

Cavity Insulation: Provide sound attenuation blankets in cavity formed by studs between shaftwall board and room-side finish.

PART 3 - EXECUTION

EXAMINATION

Examine substrates which gypsum board shaft wall construction attaches to or abuts including preset hollow metal frames, elevator hoistway door frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of shaft wall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION OF GYPSUM BOARD SHAFT WALL SYSTEMS

General: Install gypsum board shaft wall systems to comply with performance and other requirements indicated as well as with manufacturer's installation instructions and the following:

ASTM C 754 for installation of steel framing.

Division 9 Section "Gypsum Drywall" for application and finishing of gypsum wallboard.

Do not bridge building expansion joints with shaft wall system, frame both sides of joints with furring and other support as indicated.

Install supplementary framing, blocking and bracing to support gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings and similar work which

cannot be adequately supported directly by regular framing of gypsum board shaft wall system.

Support elevator hoistway door frames independently of shaft wall framing system, or reinforce system in accordance with system manufacturer's instructions.

Where handrails are indicated for direct attachment to gypsum board shaft wall system, provide not less than a 0.0341 inch thick by 4 inch wide galvanized steel reinforcement strip, accurately positioned and secured behind not less than one gypsum board face layer of 1/2 inch or 5/8 inch thickness.

Integrate stair hanger rods with gypsum board shaft wall system where indicated (and where possible); by locating cavity of system as required to enclose rods.

At penetrations in shaft wall, maintain fire resistance rating of entire shaft wall assembly by installing supplementary fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

Isolate shaft wall system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading. Comply with details shown and with manufacturer's instructions.

Seal gypsum board shaft walls at perimeter of each section which abuts other work and at joints and penetrations within each section. Install acoustical sealant to withstand dislocation by air pressure differential between shaft and external spaces; comply with manufacturer's instructions and ASTM C 919.

In elevator shafts where gypsum board shaft wall system cannot be positioned within 2 inches of shaft face of structural beams, floor edges and similar projections into shaft, install 1/2-inch or 5/8-inch thick gypsum board cants covering tops of projections as follows:

Slope cant panels not more than 15 degrees from vertical. Set base-edge of panels in gypsum board adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft wall framing.

Where cants exceed 2 inches, support gypsum board with steel studs spaced 24 inches o.c.; extend studs from top of projection to shaft wall framing behind cant.

PROTECTION

Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures gypsum board shaft wall system construction being without damage or deterioration at time of Substantial Completion.

END OF SECTION 09270

SECTION 09300 - TILE

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Unglazed quarry tile.

Glazed wall tile.

Related Sections: The following sections contain requirements that relate to this Section:

Division 3 Section "Concrete Work" for monolithic slab finishes specified for tile substrates.

Division 7 Section "Joint Sealers" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

Division 9 Section "Gypsum Drywall" for cementitious backer units installed as part of gypsum wallboard systems.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data for each type of product specified.

Samples for initial selection purposes in form of manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures, and patterns available for each type and composition of tile indicated. Include samples of grout and accessories involving color selection.

Samples for verification purposes of each item listed below, prepared on samples of size and construction indicated, products involve color and texture variations, in sets showing full range of variations expected.

Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on plywood or hardboard backing and grouted.

Full-size units of each type of trim and accessory for each color required.

Metal edge strips in 6-inch lengths.

Master grade certificates for each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of tile and tile setting and grouting products with requirements indicated.

Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

QUALITY ASSURANCE

Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

DELIVERY, STORAGE, AND HANDLING

Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

PROJECT CONDITIONS

Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

EXTRA MATERIALS

Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

MANUFACTURERS

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Unglazed Quarry Tile:

American Olean Tile Co., Inc.
Buchtal Corp. USA
Dal-Tile Corp.
Metropolitan Ceramics Div.; Metropolitan Industries, Inc.
Mid-State Tile Co.
Monarch Tile Manufacturing, Inc.
Summitville Tiles, Inc.
Texeramics Inc.
Universal Ceramics, Inc.

Glazed Quarry Tile:

American Olean Tile Co., Inc.
Buchtal Corp. USA
Dal-Tile Corp.
Mid-State Tile Co.
Summitville Tiles, Inc.
Wenczel Tile Co. of Florida

Glazed Wall Tile:

American Marrazzi Tile, Inc.
American Olean Tile Co., Inc.
Buchtal Corp. USA
Dal-Tile Corp.
International American Ceramics/Laufen
Mid-State Tile Co.
Monarch Tile Manufacturing, Inc.
Summitville Tiles, Inc.
United States Ceramic Tile Co.
Villeroy & Boch (U.S.A.) Inc.
Wenczel Tile Co. of Florida

Dry-Set Mortars and Grouts:

American Olean Tile Co., Inc.
Boiardi Products Corp.
Bostik Construction Products Div.
Custom Building Products
C-Cure Chemical Co.
DAP Inc. Div.; USG Corp.
L & M Mfg. Inc.
Laticrete International Inc.
Mapei Corp.
Southern Grouts & Mortars, Inc.
Summitville Tiles, Inc.
Syracuse Adhesives Co.

Polyvinyl-Acetate-Based Latex-Portland Cement Dry Mortar Mix:

Laticrete International Inc.

Ethylene-Vinyl-Acetate-Based Latex-Portland Cement Dry Mortars:

American Olean Tile Co., Inc.
Boiardi Products Corp.
Bostik Construction Products Div.
C-Cure Chemical Co.
DAP Inc. Div.; USG Corp.
Mapei Corp.
Southern Grouts & Mortars, Inc.
Summitville Tiles, Inc.
Syracuse Adhesives Co.

Latex-Emulsion-Based Latex-Portland Cement Mortars:

American Olean Tile Co., Inc.
Boiardi Products Corp.
Bostik Construction Products Div.
Custom Building Products
C-Cure Chemical Co.
DAP Inc. Div.; USG Corp.
L & M Mfg. Inc.
Laticrete International Inc.
Mapei Corp.
Southern Grouts & Mortars, Inc.
Summitville Tiles, Inc.
Syracuse Adhesives Co.

Furan Mortars and Grouts:

Atlas Minerals & Chemicals, Inc.
L & M Mfg. Inc.
Laticrete International Inc.
Summitville Tiles, Inc.

Modified Epoxy Emulsion Mortars:

American Olean Tile Co., Inc.
Boiardi Products Corp.
Bostik Construction Products Div.
Custom Building Products
C-Cure Chemical Co.
DAP Inc. Div.; USG Corp.
L & M Mfg. Inc.
Laticrete International Inc.
Mapei Corp.
Summitville Tiles, Inc.
Syracuse Adhesives Co.

Ethylene-Vinyl-Acetate-Based Latex-Portland Cement Prepackaged Dry Grout Mixes:

American Olean Tile Co., Inc.
Boiardi Products Corp.
C-Cure Chemical Co.
DAP Inc. Div.; USG Corp.
Southern Grouts & Mortars, Inc.
Summitville Tiles, Inc.

Styrene Butadiene Rubber Emulsions for Latex-Portland Cement Grouts:

Boiardi Products Corp.
C-Cure Chemical Co.
Laticrete International Inc.
Southern Grouts & Mortars, Inc.
Syracuse Adhesives Co.

Acrylic Emulsions for Latex-Portland Cement Grouts:

American Olean Tile Co., Inc.
Boiardi Products Corp.
Bostik Construction Products Div.
Custom Building Products
C-Cure Chemical Co.
DAP Inc. Div.; USG Corp.
L & M Mfg. Inc.
Laticrete International Inc.
Mapei Corp.
Southern Grouts & Mortars, Inc.
Summitville Tiles, Inc.
Syracuse Adhesives Co.

Chemical-Resistant, Water-Cleanable Tile Grouting Epoxies:

American Olean Tile Co., Inc.
Atlas Minerals & Chemicals, Inc.
Bostik Construction Products Div.
C-Cure Chemical Co.
L & M Mfg. Inc.
Laticrete International Inc.
Mapei Corp.
Southern Grouts & Mortars, Inc.
Summitville Tiles, Inc.
Syracuse Adhesives Co.

Modified Epoxy Emulsion Grouts:

Boiardi Products Corp.
Bostik Construction Products Div.
Custom Building Products
C-Cure Chemical Co.
L & M Mfg. Inc.
Laticrete International Inc.
Summitville Tiles, Inc.
Syracuse Adhesives Co.

PRODUCTS, GENERAL

ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.

Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.

ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

Coefficient of Friction of Wearing Surfaces: Wet and dry values of at least 0.60" when tested in accordance with CTI 69-5.

Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

Provide selections made by Architect from manufacturer's full range of standard colors, textures, and patterns for products of type indicated.

Provide tile trim and accessories from selections made by Architect from manufacturer's full range of standard colors, textures, and patterns for products of type indicated.

Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies that this type of mounting is suitable for these kinds of uses and has been successfully used on other projects.

Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

TILE PRODUCTS

Unglazed Quarry Tile: Provide square-edged flat tile complying with the following requirements:

Wearing Surface: Abrasive aggregate embedded in surface where indicated; nonabrasive elsewhere.

Nominal Facial Dimensions: As indicated.

Nominal Thickness: As indicated.

Face: As indicated.

For furan grouted quarry tile, precoat with temporary protective coating.

Glazed Quarry Tile: Provide square-edged flat tile complying with the following requirements:

Wearing Surface: Abrasive embedded in surface where indicated; nonabrasive elsewhere.

Nominal Facial Dimensions: As indicated.

Nominal Thickness: As indicated.

Face: As indicated.

Glazed Wall Tile: Provide flat tile complying with the following requirements:

Nominal Facial Dimensions: As indicated.

Nominal Thickness: As indicated.

Face: As indicated.

Mounting: Factory back-mounted.

Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:

Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.

Shapes: As follows, selected from manufacturer's standard shapes:

Base for Thinset Mortar Installations: Straight.

Wainscot Cap for Thinset Mortar Installations: Surface bullnose.

Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above.

External Corners for Thinset Installations: Surface bullnose.

Internal Corners: Field-butted square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.

Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide a reduction in thickness from 1/2 inch to 1/4 inch across nominal 4 INCH dimension.

Accessories for Glazed Wall Tile: Provide vitreous china accessories of type and size indicated and in color and finish to match adjoining glazed wall tile.

One soap holder for each shower and tub indicated.

SETTING MATERIALS

Latex-Portland Cement Mortar: ANSI A118.4, composition as follows:

Prepackaged dry mortar mix composed of portland cement, graded aggregate, and the following dry polymer additive in the form of a reemulsifiable powder to which only water is added at job site.

Dry Polymer Additive: Manufacturer's standard.

GROUTING MATERIALS

Latex-Portland Cement Grout: ANSI A118.6, color as indicated, composition as follows:

Prepackaged dry grout mix composed of portland cement, graded aggregate, and the following dry polymer additive in the form of a reemulsifiable powder to which only water is added at job site.

Dry Polymer Additive: Polyvinyl acetate or ethylene vinyl acetate.

Chemical-Resistant Epoxy Grout: ANSI A118.3, color as indicated.

Provide product capable of resisting continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, as certified by mortar manufacturer for intended use.

Chemical-Resistant Furan Grout: ANSI A118.5.

MISCELLANEOUS MATERIALS

Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate unless otherwise indicated.

Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout, is compatible with tile and mortar/grout products, and is easily removable after grouting is completed without damaging grout or tile.

Petroleum paraffin wax, fully refined, tasteless, odorless, containing at least 0.5 percent oil with a melting point of 120 deg F (49 deg C) to 140 deg F (60 deg C) per ASTM D 87.

Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

MIXING MORTARS AND GROUT

Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.

Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

Do not proceed with installation until unsatisfactory conditions have been corrected.

PREPARATION

Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:

Petroleum paraffin wax or grout release.

INSTALLATION, GENERAL

ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.

TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated.

Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.

Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

Lay out tile wainscots to next full tile beyond dimensions indicated.

Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

Locate joints in tile surfaces directly above joints in concrete substrates.

Grout tile to comply with the requirements of the following installation standards:

For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

For chemical-resistant epoxy grouts, comply with ANSI A108.6.

For chemical-resistant furan grouts, comply with ANSI A108.8.

FLOOR INSTALLATION METHODS

Quarry Tile: Install tile to comply with requirements indicated below for setting-bed method, TCA installation method related to type of subfloor construction, and grout type:

Portland Cement Mortar: ANSI A108.1.

Bond Coat: Latex-portland cement mortar on cured bed, ANSI A108.5.

Latex-portland cement mortar.

Latex-Portland Cement Mortar: ANSI A108.5.

Concrete Subfloor, Interior: TCA F115.

Grout: Chemical-resistant epoxy or furan at contractor's option.

WALL TILE INSTALLATION METHODS

Install types of tile designated for wall application to comply with requirements indicated below for setting-bed methods, TCA installation methods related to subsurface wall conditions, and grout types:

Latex-Portland Cement Mortar: ANSI A108.5.

Wood or Metal Studs, Interior: TCA W243.
Bathtub Walls, Cementitious Backer Units: TCA B412.

Grout: Latex-portland cement.

CLEANING AND PROTECTION

Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

Remove latex-portland cement grout residue from tile as soon as possible.

Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.

When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09300

640 Tremont Street
Boston, Massachusetts

END OF SECTION 09900

SECTION 10522 - FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of fire extinguishers, and cabinets is indicated on drawings.

Definition: "Fire extinguishers" as used in this section refers to units which can be hand-carried as opposed to those which are equipped with wheels or to fixed fire extinguishing systems.

Types of products required include:

Fire extinguishers.

Fire extinguisher cabinets.

Mounting brackets.

Fixed fire protection systems are specified in Division-15 sections.

QUALITY ASSURANCE

Single Source Responsibility: Obtain products in this section from one manufacturer.

Coordination: Verify that fire extinguisher cabinets are sized to accommodate fire extinguishers of type and capacity indicated which will be provided by Owner under separate contract.

UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

SUBMITTALS

Product Data: Submit product data for each type of product included in this section. For fire extinguisher cabinets include roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type end materials, trim style and door construction, and panel style and materials.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

J. L. Industries.
Larson Mfg. Co.
Johnson-Lee, Division of W.F. Lee Corp.
Muckle Manufacturing, Division of Technico, Inc.
Watrous, Inc.

FIRE EXTINGUISHERS:

General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard which comply with requirements of governing authorities.

Fill and service extinguishers to comply with requirements of governing authorities and manufacturer's requirement.

Abbreviations indicated below to identify extinguisher types relate to UL classification and rating system and not, necessarily, to type and amount of extinguishing material contained in extinguisher.

Multi-Purpose Dry Chemical Type: UL-rated 4-A:60-B: C 10 lb. nominal capacity, in enameled steel container, for Class A, Class B and Class C fires.

MOUNTING BRACKETS

Provide manufacturer's standard bracket designed to prevent accidental dislodgement of extinguisher, of sizes required for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

Provide brackets for extinguishers not located in cabinets and for those located in cabinets, where indicated or required.

FIRE EXTINGUISHER CABINETS

General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.

Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

Cabinet Type: Suitable for mounting conditions indicated, of the following types:

Semi-Recessed: Cabinet box (tub) partially recessed in walls of shallow depth.

Surface-Mounted: Cabinet box (tub) fully exposed and mounted directly on wall.

Trim Style: Fabricate trim in one piece with corners mitered, welded and ground smooth.

Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.

Enameled Steel: Manufacturer's standard flush, hollow steel door construction with tubular stiles and rails.

Door Style: Manufacturer's standard design as indicated below and on drawing.

Bubble Type: One-piece molded clear plastic.

Door Hardware: Provide manufacturer's standard door operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam action latch, or door pull, exposed or concealed, and friction latch. Provide concealed or continuous type hinge permitting door to open 180 degrees.

FACTORY FINISHING OF FIRE EXTINGUISHER CABINETS

General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.

Painted Finishes: Provide painted finish to comply with requirements indicated below for extent, preparation and type:

Extent of Painted Finish: Apply painted finish to both concealed and exposed surfaces of cabinet components except where other than a painted finish is indicated.

Color: Provide color or color matches indicated, or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

Preparation: Clean surfaces of dirt, grease, and loose rust or mill scale.

Baked Enamel Finish: Immediately after cleaning and pretreatment, apply cabinet manufacturer's standard baked enamel finish system to the following surfaces:

Interior of cabinet.

Exterior of cabinet except for those surfaces indicated to receive another finish.

Anodized Aluminum Finishes: Provide architectural anodic coatings complying with the following requirements:

Class II Clear (Natural) Anodized Finish: AA-M12C22A31 (mechanical finish, non-specular as fabricated; chemical etch, medium matte; 0.4 mil min. thick clear anodic coating).

PART 3 - EXECUTION

INSTALLATION

Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

Where exact location of surface-mounted cabinets and bracket-mounted fire extinguishers is not indicated, locate as directed by Architect.

END OF SECTION 10522

SECTION 10550 - POSTAL SPECIALTIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified of this section.

DESCRIPTION OF WORK

Extent of postal specialties is indicated on drawings.

Postal specialties include the following:

Vertical Style Mail Boxes

QUALITY ASSURANCE

Manufacturer: Provide products of manufacturers which are approved by U.S. Postal Service when mail system is serviced by USPS.

In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for preparation of substrate, installation of anchors, and application of postal specialties units.

Requirements of Regulatory Agencies: Comply with U. S. Postal Service requirements for construction and installation of units serviced by U.S.P.S. carriers.

SUBMITTALS

Product Data: Submit manufacturer's technical data and installation instructions for postal specialties units required.

Provide manufacturer's certification that equipment proposed conforms to U.S. Postal Service regulations and has been approved by Postmaster General.

Shop Drawings: Submit shop drawings for fabrication and erection of postal specialties. Include plans, elevations and large scale details. Show anchorages and accessory items. Provide location template drawings for items supported or anchored to permanent construction.

PART 2 - PRODUCTS

VERTICAL STYLE MAIL BOXES

General: Provide vertical style mail box units of style and size indicated.

Each gang of box units to open by mail carrier's key, tilting forward to receive incoming mail. Tenant's key only operates a single, side-hinged door.

Doors and Frames: Provide manufacturer's standard heavy metal construction, ganged and nested units. Furnish a card holder for tenant identification, behind each box. Construct doors with concealed full-length flush hinge, and slots to receive tenants name and number.

Provide number identification as show or, if not shown, as selected by Architect from manufacturer's standards.

Fabricate units of aluminum extrusions, with satin anodized finish.

Locking: Furnish 5-pin tumbler cylinder lock capable of at least 1000 key changes, with 2 keys for each box door. Key each box differently and master key. Delivery box keys and master keys to Owner's representative, with record of each corresponding lock and key numbers.

Boxes and Wall Receptacles: Manufacturers standard galvanized steel or corrosion resistant metal construction.

Finish units with factory-applied primer and baked enamel, color as selected by Architect.

Directory: Provide manufacturer's standard directory unit, of size and location indicated. Provide units of same materials and finish as box frames, unless otherwise indicated.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

American Device Mfg. Co.
Auth Electric Co.
Bommer Industries, Inc.
Cutler-Federal, Inc.
Dura Steel Products Inc.
Florence Corp.
Jensen General Corp.
Miami Carey.
Perma-Bilt Industries.

PART 3 - EXECUTION

INSTALLATION

Install units complying with manufacturer's instructions and final drawings.

Final acceptance will be contingent upon compliance with U. S. Postal Service requirements.

END OF SECTION 10550

SECTION 10800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of each type of toilet accessory is indicated on drawings and schedules.

Types of toilet accessories required include the following:

Toilet tissue dispenser.
Grab bars.
Shower curtain rod.
Towel bars.
Medicine cabinet.
Robe hook.
Tumbler and toothbrush holder.
Soap dish, surface mounted.

QUALITY ASSURANCE

Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.

Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

Products: Provide products of same manufacturer for each type of accessory unit and for units exposed in same areas, unless otherwise acceptable to Architect.

SUBMITTALS

Product Data: Submit manufacturer's technical data and installation instructions for each toilet accessory.

Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering toilet accessories which may be incorporated in the work include, but are not limited to, the following:

A&J Washroom Accessories.
American Specialties, Inc.
Bobrick Washroom Equipment, Inc.
Bradley Corporation.
Franklin Brass Mfg. Co.
Hallmark-Nutone/Div. Scovill.
G.M. Ketcham Co., Inc.
McKinney/Subsidiary Kidde, Inc.
Parker-Scovill.
Watrous,Inc.

MATERIALS, GENERAL

Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gage (.034") minimum, unless otherwise indicated.

Brass: Leaded and unleaded, flat products, FS QQ-B-613; Rods, shapes, forgings, and flat products with finished edges, FS QQ-B-626.

Sheet Steel: Cold rolled, commercial quality ASTM A 366, 20-gage (.040") minimum, unless otherwise indicated. Surface preparation and metal pretreatment as required for applied finish.

Galvanized Steel Sheet: ASTM A 527, G60.

Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.

Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.

Mirror Glass: FS DD-G-451, Type I, Class 1, Quality q2, 1/4" thick, with silver coating, copper protective coating, and non-metallic paint coating complying with FS DD-M-411.

Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

TOILET TISSUE DISPENSERS

Single-Roll Dispenser: Size to accommodate core tissue to 5" diameter roll.

Fabrication: Spindleless chrome-plated zinc alloy construction with tension spring delivery control; designed for surface mounting.

GRAB BARS

Stainless Steel Type: Provide grab bars with wall thickness not less than 18 (.050") gage and as follows:

Mounting: Concealed, manufacturer's standard flanges and anchorages.

Mounting: Exposed, manufacturer's standard flanges and anchorages.

Clearance: 1-1/2" clearance between wall surface and inside face of bar.

Gripping Surfaces: Manufacturer's standard non-slip texture.

Medium-Duty Size: Outside diameter of 1-1/4".

SHOWER AND BATH ACCESSORIES

Shower Curtain Rod, Normal Duty: 1" o.d., 20-gage (.040") stainless steel satin finish, furnish 3" o.d. minimum 20-gage stainless steel flanges with satin finish, designed for exposed fasteners.

Towel Bar: 24" long satin-finished Type 304 stainless steel tubular (3/4" square) bar and rectangular end brackets. Provide galvanized backplates for concealed mounting. Provide two per bathroom.

MISCELLANEOUS ACCESSORIES

Medicine Cabinet: Unit designed for recessed mounting in nominal 4" depth wall and consisting of hinged stainless steel framed mirror door concealing storage cabinet with minimum 3 adjustable shelves. Door equipped with full length piano hinge and spring-buffered rod type stop and magnetic door catch. Fabricate mirror frame, door, hinge of stainless steel, mirror glass quality as specified under "Materials, General". Cabinet and shelves shall be sheet steel with white baked enamel finish. Furnish in nominal 18" x 24" mirror size.

Double Robe Hook: Heavy-duty satin-finished stainless steel double prong robe hook; rectangular wall bracket with backplate for concealed mounting.

Tumbler and Toothbrush Holder: Satin-finished stainless steel unit with 2-1/4" diameter hole in center to hold tumbler and 2 holes on each side to accommodate a total

of 4 toothbrushes, rectangular wall bracket equipped with backplate for concealed mounting.

Soap Dish: Satin-finished stainless steel soap dish with rectangular wall bracket equipped with backplate for concealed mounting.

FABRICATION

General: Only an unobtrusive stamped logo of manufacturer, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.

Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all welded construction, without mitered corners. Hang doors or access panels with full-length stainless steel piano hinges. Provide anchorage which is fully concealed when unit is closed.

PART 3 - EXECUTION

INSTALLATION

Install toilet accessory units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations and at heights indicated.

ADJUSTING AND CLEANING

Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

Clean and polish all exposed surfaces after removing temporary labels and protective coatings.

END OF SECTION 10800

SECTION 11150 - PARKING CONTROL EQUIPMENT

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of parking lot equipment is shown on drawings.

Types of parking lot equipment required include the following:

Vehicle detectors.
Card control units.

Concrete for islands and curbing is specified in Division 3.

Roadway guard rails and parking accessories are specified in Division 2.

Overhead coiling grille is specified in Division 8.

Electrical service is specified in Division 16.

SUBMITTALS

Product Data: Submit manufacturer's product data, specifications, installation, and maintenance instructions for each type of parking equipment required.

Provide templates for anchor bolts and other items encased in concrete or below finished surfaces in sufficient time so as not to delay the work.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Automatic Parking Devices, Inc.
Cincinnati Time, A Unit of General Signal.
Federal APD.
Stanley Parking Systems, Division of the Stanley Works.

VEHICLE DETECTOR

General: Provide solid state, electronic detector units, designed to detect the presence or transit of a vehicle over an embedded loop of wire and emit an electrical pulse to operate the overhead coiling grille (specified in another section). Provide a 3-position sensitivity switch and detection indicator light on the front panel.

Detector Loops: Provide detector loops at each side of the overhead coiling grille consisting of multiple strands of wire of the gage, number of turns, size, and method of placement as recommended by the parking equipment manufacturer.

Operation: The detector loop located on the inside side of the overhead coiling grille shall close the grille upon detecting a vehicle after the opening of the door by the card control unit, and open the grille upon detection of a vehicle when the grille is closed and has not been activated by the card control unit. The detector loop located on the outside side of the overhead coiling grille shall close the grille upon detecting a vehicle after the grille has been opened by the inside detector.

CARD CONTROL

General: Provide a pedestal mounted card control unit to activate the overhead coiling grille specified in another section.

Card Control Unit: Fabricate housing of welded cold-rolled steel sheet, with weatherproof access panel on the front. Provide flush mounted lock and two keys to operate the access panel. Mount the housing on a 2" square steel tube pedestal with a curved top to receive the housing, and a trim plate to cover anchor bolts. Finish units with the manufacturer's standard baked enamel coating system.

Operation: Insertion of a specially prepared plastic card with a bar code causes magnetically actuated internal elements to activate the overhead coiling grille.

ACCESSORIES

General: Provide anchor bolts and other accessory items as required for installation and operation. Hot-dip galvanize anchor bolts and other accessory items in accordance with requirements of ASTM A 153.

PART 3 - EXECUTION

INSTALLATION

General: Install parking lot equipment in accordance with the manufacturer's instructions and placement drawings.

Coordinate placement of anchors and accessories encased in concrete with Division 3.

END OF SECTION 11150

SECTION 11450 - RESIDENTIAL EQUIPMENT

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of residential equipment required is indicated on drawings and specified herein.

Types of residential equipment required include the following:

Gas ranges.
Gas cooktops.
Range hoods.
Gas wall ovens.
Refrigerator/freezers.
Dishwashers.

Plumbing requirements are specified in Division-15.

Electrical services and connections are specified in Division-16.

QUALITY ASSURANCE

Certification Labels: Provide residential equipment which complies with standards and bears certification labels as follows:

Energy Ratings: Provide energy guide labels with energy cost analysis (annual operating costs) and efficiency information as required by Federal Trade Commission.

UL Standards: Provide residential equipment with UL labels.

ANSI Standards: Provide gas-burning residential equipment with American Gas Assoc. (AGA) seal of approval, complying with ANSI Z21-series seal of approval.

Uniformity: Provide products of same manufacturer for each type of residential equipment required.

To greatest extent possible, provide residential equipment by single manufacturer for the entire project.

SUBMITTALS

Product Data: Submit manufacturer's specifications and installation instructions for each type of residential equipment, including data indicating compliance with requirements. Submit operating and maintenance instructions for each item of residential equipment.

Schedule: Submit schedule of residential equipment, using same room designations shown on drawings.

Example of required format for residential equipment schedule is included in last article of this section.

DELIVERY AND STORAGE

Deliver products to project site in manufacturer's undamaged protective containers, after spaces to receive them have been fully enclosed.

SPECIFIED PRODUCT WARRANTIES

Submit manufacturer's standard written warranty for each item of residential equipment.

PART 2 - PRODUCTS

MATERIALS AND FABRICATION

Colors: Provide manufacturer's standard colors as shown or scheduled. If no color indicated, provide white.

Gas Ranges:

30" Freestandings Type: Unit with porcelain enamel, hinged or lift-off recessed cooktop with built-in spillover bowls; 4 - 9000 BTUH burners with removable porcelainized steel grates; pilotless ignition system; self-cleaning oven equipped with manually switched light, door with window and safety locking feature, 2 adjustable chrome racks, and porcelain enamel broiler/roaster pan with chrome grille insert; control panel with clock end timer; adjustable legs.

Availeble Manufacturer: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following.

Sears, Roebuck & Co.
Modern Maid; Raytheon Co.

White-Westinghouse.

Gas Cooktops:

Countertop Type: Built-in unit with lift-up, self-edged top surface and porcelain enamel finish; pilotless ignition system; four 9000 BTUH burners with removable porcelainized steel grates.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Chambers Corp.
Sears, Roebuck & Co.
Modern Maid; Raytheon Co.

Range Hoods:

Ventilating Type: 30" hood for mounting below wall cabinets, with 2-speed fan, permanent washable filter, built-in lighting, baked-on enamel finish, rated at 160 cfm minimum; complete with duct, wall or roof cap and shutter.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Amana Refrigeration, Inc.
Broan Mfg. Co.
Chambers Corp.
General Electric.
Hotpoint.
Sears, Roebuck & Co.
Modern Maid; Raytheon Co.
Whirlpool Home Appliances.
White-Westinghouse.

Gas Wall Ovens:

Oven/Broiler: Built-in unit with continuous cleaning oven and lower broiling compartment for installation in 24" wide cabinet; control panel with clock, timer, and automatic oven controls; pilotless ignition system; oven equipped with light, adjustable chrome racks, black glass door with window; including porcelain enamel broiler pan with chrome grille insert.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Sears, Roebuck & Co.
Modern Maid; Raytheon Co.

Refrigerator/Freezers:

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Amana Refrigerations, Inc.
Frigidaire; White Consolidated Ind.
General Electric.
Hotpoint.
Sears, Roebuck & Co.
Whirlpool Home Appliances.
White-Westinghouse.

Side-By-Side type: Freestanding, two-door unit; both compartments frostless, with separate temperature controls; switch for condensation control heating element at freezer opening; storage features including adjustable shelves, meat compartment, vegetable crisper(s), butter conditioning compartment, door shelves, removable egg trays or bins, and not less than 2 ice cube trays; adjustable rollers.

Capacity: Minimum values, measured according to ANSI B38.1 and certified by AHAM.

Total volume: 19.0 cubic feet

Top Freezer Type: Freestanding, two-door unit; both compartments frostless, with separate temperature controls; switch for condensation control heating element at freezer opening; storage features including adjustable shelves, meat compartment, vegetable crisper(s), butter conditioning compartment, removable egg trays or bins, door shelves and not less than two ice cube trays; reversible doors; adjustable rollers.

Capacity: Minimum values, measured according to ANSI B38.1 and certified by AHAM:

Total volume: as indicated.

Dishwashers:

Built-in Type: Undercounter automatic unit sized to replace 24" base cabinet; porcelain enamel interior and sound-absorbing exterior insulation; full-extension upper and lower racks and removable silverware basket; not less than two wash cycles with not less than two wash levels and food pulverizer; energy saving drying cycle; operable at

water pressures from 20 to 120 psi and requiring not more than 12.0 gallons of water for normal wash cycle.

Finish: Provide the following finish for door front and lower access panel:

Manufacturer's standard.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

Frigidaire; White Consolidated Ind.
General Electric.
Kitchen Aid Div.; Hobart.
Hotpoint.
In-Sink-Erator Div.; Emerson Electric.
Sears, Roebuck & Co.
Whirlpool Home Appliances.

PART 3 - EXECUTION

INSTALLATION

General: Comply with manufacturer's instructions and recommendations.

Built-In Equipment: Securely anchor units to supporting cabinetry or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate for proper operation of equipment.

Utilities: Refer to Divisions 15 and 16 for plumbing and electrical requirements.

ADJUST AND CLEAN

Testing: Test each item of residential equipment to verify proper operation. Make necessary adjustments.

Accessories: Verify that accessory items required have been furnished.

Cleaning: Remove packing material from residential equipment items and leave units in clean condition, ready for operation.

EQUIPMENT SCHEDULE

Refrigerator:	Handicapped units: Sears Kenmore #49001 (side by side). Three bedroom units: Sears Kenmore #69821 (18 cf.). All other units: Sears Kenmore #60401 (14 cf.).
30" Gas Range:	Sears Kenmore #61081 (all units except handicapped units).
Cook Tops:	Sears Kenmore #43461 (handicapped units only).
Wall Ovens:	Sears Kenmore #40389 (handicapped units only).
Range Hoods:	Sears Kenmore #51391 R8.
Dishwashers:	Sears Kenmore #14195.

END OF SECTION 11450

SECTION 12390 - KITCHEN CABINETS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of kitchen cabinets is indicated on drawings.

Sink units in countertops are specified in a Division-15 section.

Appliances mounted in kitchen cabinets are specified in a Division-11 section.

QUALITY ASSURANCE

Kitchen Cabinet Standard: ANSI A161.1.

> NKCA Certification: Where indicated, provide kitchen cabinets with National Kitchen Cabinet Association (NKCA) "Certified Cabinet" seal affixed in a semi-concealed location evidencing compliance with above standard.

Countertop Standard: ANSI A161.2.

Field Measurements: Verify sizes and shapes of countertops prior to fabrication by field measurements taken after base cabinets are installed.

SUBMITTALS

Product Data: Submit manufacturer's technical product data and installation instructions indicating materials, hardware, and finishes used in fabrication of kitchen cabinets, as required to show compliance with specifications.

Shop Drawings: Submit shop drawings showing location and size of each type of cabinet and countertops, accessories, materials, finishes, hardware types and locations, fillers, etc. Include fully dimensioned plans and elevations and indicate details of anchorage to countertop and to walls.

PRODUCT DELIVERY, STORAGE AND HANDLING

Protect wood cabinets and countertops during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

Do not deliver wood cabinets and countertops until painting, wet work, grinding and similar operations, which could be performed before installation of kitchen cabinets, have been completed in installation areas. Store kitchen cabinets and countertops in installation areas or, if that is impracticable, in areas with ambient conditions meeting same requirements.

JOB CONDITIONS

Conditioning: Manufacturer shall advise Contractor of temperature and humidity requirements for cabinet installation areas. Do not install cabinets and countertops until required temperature and relative humidity have been stabilized and will be maintained in installation areas.

Maintain temperature and humidity in installation areas as required to maintain moisture content of installed cabinet work within a tolerance range of the optimum moisture content acceptable to cabinet manufacturer, from date of installation through remainder of construction period.

PART 2 - PRODUCTS

DEFINITIONS

Exposed portions of cabinets include all surfaces including edges visible when doors and drawers are closed. Also included are visible surfaces and visible edges of shelves in open cabinets or behind glass doors and underside of bottoms of cabinets over 4'-0" above floor.

Semi-exposed portions of cabinets include surfaces behind opaque doors and drawer fronts including shelves, dividers, interior faces of cabinet ends, backs, tops and bottoms, drawer sides, backs and bottoms, and back face of doors. Also included are underside of bottoms of cabinets between 2'-0" and 4'-0" from floor and flat tops 5'-9" or more above floor.

Concealed portions of cabinets include sleepers, web frames, dust panels and other surfaces not normally visible after installation, including underside of bottoms of cabinets less than 2'-0" above floor.

BASIC MATERIALS

Particleboard: ANSI A208.1 mat-formed particleboard, Grade 1-M-2 with minimum density of 40 lbs. per cu. ft., internal bond of 60 psi; and minimum screw holding capacity of 225 lbs. on faces and 200 lbs. on edges.

Plastic Laminate: NEMA LD-3, of thickness, type and grade designation indicated; in colors or patterns and finishes indicated, or, if not indicated, as selected by Architect from manufacturer's standard selections.

Hardwood Plywood: PS 51, (proposed ANSI A99.1), Good Grade (1) or better, of thickness, species, cut and core construction indicated.

Hardwood Lumber: Clear, dry, sound, and free of defects selected from First Grade lumber (NHLA), of species indicated.

Hardboard: ANSI A135.4, Class 1, tempered.

Decorative Boards: Low pressure melamine plastic laminate composite panels complying with NEMA LQ 1, of thickness and type indicated; in colors or patterns and finishes indicated, or, if not indicated, as selected by Architect from manufacturer's standard choices.

Medium Density Fiberboard: ANSI A208.2, NPA 4, of thickness indicated.

WOOD CABINETS, TRANSPARENT FINISH:

Exposed Materials: Do not juxtapose materials noticeably dissimilar in color, grain, figure and natural color markings.

Solid lumber: Selected for compatible grain and color of the following species:

Natural Birch.
Northern Hard Maple.
Red or White Oak.
Pine.
Ash.
Cherry.

Plywood Face Veneer: Same species as exposed lumber, unless otherwise indicated, selected for grain and color compatible with exposed solid lumber, no defects. Edgeband exposed edges with solid wood of same species as face veneer.

Semi-Exposed Materials:

Solid Lumber: Dry, sound, selected to eliminate appearance defects, of any species of hardwood or softwood with color and grain characteristics similar to exposed portions.

Plywood: Species to match color and grain of exposed members; with particleboard core or veneer core as standard with manufacturer; unless otherwise indicated.

Concealed Members: Solid lumber, plywood, particleboard or hardboard, as indicated.

Style of Face Construction:

Flush Overlay Style: Provide base, wall and full height units (if any) with drawer fronts, doors and fixed panels (if any) overlaying and concealing face frames of cabinet body, unless otherwise indicated.

Face Frame Style: Provide base, wall and full height units (if any) with face frames of cabinets exposed around drawer fronts and doors.

Drawer Fronts and Doors: Surface applied.

Drawer Fronts and Doors: Recessed flush with cabinet front.

Flush Style Door Construction: Lumber core plywood, 5 ply with hardwood face veneers and crossbanding.

Flush Style Drawer Fronts: Same construction as door or, where standard with manufacturer, solid or glued-up lumber, not less than 1/2" thick.

Stile and Rail Drawer Fronts and Doors: Of design indicated, with stiles and rails of solid lumber, 3/4" thick for doors and 5/8" thick for drawer fronts, and center panels as follows:

Plywood, 1/4" thick.

Cabinet Construction, General:

Face Frames: Not less than 1" x 1-5/8" solid lumber rails and stiles with glued mortise and tenon joints.

Exposed Ends: Not less than 1/2" thick, medium density particleboard core with exterior veneer to match door and drawer fronts, and minimum 4-mil vinyl laminate on interior surfaces. Connect to stile with pressure-glued tongue and plow joint, and supplemented by concealed mechanical fasteners.

Unexposed Ends: Not less than 1/2" thick, medium density particleboard with minimum 4-mil prefinished vinyl laminate on interior surfaces. Attach to front frame in same manner as exposed ends.

Back, Top and Bottom-Rails: Not less than 3/4" x 3" solid lumber, machined to interlock with end panels, and rabbeted to receive top and bottom panels; with back rails secured under pressure with glue and mechanical fastening devices.

Shelving: Not less than 5/8" thick particleboard core plywood or 1/2" thick medium density particleboard prefinished with minimum 4-mil vinyl laminate on top, bottom and exposed (front) edge.

Wall Cabinet Construction:

Tops and Bottoms: Not less than 1/2" thick particleboard or 3/8" thick hardwood plywood, fully supported by, and secured in, rabbets in end panels, front frame and back rail.

Backs: Not less than 1/8" hardboard or 3/16" plywood fastened to machined rear edge of ends and to top and bottom hanger rails.

Base Cabinet Construction:

Front-Frame Drawer Rails: Not less than 1" x 1-1/4" lumber mortised and fastened into face frame.

Bottoms: Not less than 1/2" thick particleboard with 4-mil vinyl laminate finish or 3/8" thick, 5-ply veneer core plywood secured in and fully supported rabbets in end panels, front frame and back bottom rail.

Back Panels: Not less than 1/8" thick hardboard fastened to machined rear edge of end panels and to top and bottom rails. Interior surface prefinished with 4-mil vinyl laminate.

Toe Boards: Not less than 5/8" particleboard core attached between end panels and extended from bottom panel to floor.

Corner Blocks: Glued and fastened in each of 4 top corners to maintain cabinet squareness and rigidity.

Drawer Construction:

Drawer Body: Not less than 3/8" thick vinyl-faced particleboard subfront, back and sides. Provide box-type construction with subfront and back rabbeted into sides and secured with glue and mechanical fasteners. Exposed fronts fastened to subfront with mounting screws from interior of body. Drawer bottom of not less than 1/4" thick hardboard, set into rabbets in back, sides and front.

Drawer Suspension: Minimum 50 lb. capacity twin track, side-mounted drawer glide suspension with nylon rollers, self-closing feature and positive stop.

Full-Height Cabinets:

Back panels: Minimum 3/16" thick hardwood plywood or 1/8" hardboard with 4-mil vinyl laminate on interior surface.

Top and Bottom Panels: Minimum 3/8" thick hardwood plywood or 1/2" particleboard with min. 4-mil vinyl laminate on interior surfaces.

Corner Posts: Not less than 3/4" x 7/8" attached to all 4 vertical corners, fabricated with notches to provide adjustability and retainment of interior storage devices.

COUNTERTOPS

Exposed Surfacing Material: High pressure plastic laminate, 0.050" thick, General Purpose Type (GP50); except 0.042" thick, Postforming Type (PF42), where postformed countertop configuration is indicated.

Substrate (Core) for Exposed Surfacing Material: Particleboard.

Countertop Configuration: Provide countertops with the following front styles (nose), cove and backsplash style, unless otherwise indicated:

Front Style: No drip.

Cove: Direct bond.

Backsplash Style: A (Curved or waterfall shape with scribe).

Countertop Thickness: As indicated, or, if not indicated, not less than 1-1/2", unless otherwise indicated, with substrate (core) not less than 3/4" thick.

TRANSPARENT FINISH FOR KITCHEN CABINETS

Shop Finishing: Finish kitchen cabinets at shop or factory to the greatest extent possible. Defer any final touch-up, cleaning and polishing until after delivery and installation. Apply finish in a properly equipped, temperature controlled spray room free from circulating dust, dirt, sawdust, and other foreign material.

Preperation for Finishing: Carefully and smoothly machine sand parallel with grain, exposed and semi-exposed surfaces of cabinets. Hand scrape or sand exposed surfaces to remove machine marks and scratches. Remove sanding residue and other foreign material.

Finishing Materials: Manufacturer's standard products selected to comply with performance requirements in referenced kitchen cabinet standard.

Exposed Surfaces: Apply finish as follows:

Sealer Coat, if required.

Stain: To match color selected. Apply stain by hand wiping to produce maximum grain clarity, and color retention and uniformity. Allow to dry.

Sealer Coat: Catalytic curing resin-based coating to serve as initial moisture and chemical barrier and to produce bond for top coat. Allow to dry and scuff sand before applying top coat.

Top Coat: Catalytic curing resin-based coating, heat-cured to a hard, smooth furniture finish, free of imperfections.

CABINET HARDWARE

General: Provide manufacturer's standard hardware units of type, size and finish indicated, complying with ANSI A156.9, of type, material, size and finish indicated, or, if not indicated, as selected by Architect from manufacturer's standard choices.

ACCESSORIES

General: Provide manufacturer's standard accessories of type indicated.

FABRICATION

Fabricate wood kitchen cabinets to dimensions and profiles and details indicated.

Assemble units in shop in as large components as practicable to minimize field cutting and jointing.

PART 3 - EXECUTION

INSTALLATION

Install cabinets plumb, level, true and straight with no distortions. Shim as required using concealed shims. Where wood kitchen cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips and mouldings as indicated or required, and in finish to match cabinet face.

Anchor cabinets securely in place with concealed (when doors and drawers are closed) fasteners, anchored into structural support members of wall construction. Comply with manufacturer's instructions for support of units.

Attach countertops securely to base units. Spline and glue joints in countertops; provide concealed mechanical clamping of joint. Provide cutouts for fixtures and appliances as indicated; drill pilot holes at corners before making cutouts. Smooth cut edges and coat with waterproof coating or adhesive.

Complete hardware installation and adjust doors and drawers for proper operation.

CLEANING AND PROTECTION

Repair or remove and replace defective work as directed upon completion of installation.

Clean exposed and semi-exposed surfaces, touch-up finish as required. Remove and refinish damaged or soiled areas.

Protection: Advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION 12390

SECTION 14240 - HYDRAULIC ELEVATORS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

Refer to other sections of these specifications for related work which is not work of this section, including electrical service with fused disconnect switches for the elevator system, hoistway, pits, and machinery room with access, lighting, ventilation and services.

DESCRIPTION OF WORK

Extent of hydraulic elevator work is indicated on the drawings, in schedules and by provisions of this section.

Types of hydraulic elevator service required include the following:

Passenger elevator.

Definitions: Hydraulic elevator work is hereby defined to include systems in which a car is hoisted either directly or indirectly by action of a hydraulic plunger and cylinder (jack); with other components of the work including fluid storage tank, pump, piping, valves, car enclosure, hoistway entrances, control systems, signal equipment, guide rails, electrical wiring, roping, buffers, and devices for operating, dispatching, safety, security, leveling, alarm, maintenance and similar required performances and capabilities.

Elevator schedule indicates required performances, controls, capacities, features and finishes for the elevator.

QUALITY ASSURANCE

Installer Qualifications: Either the elevator manufacturer or a licensee of the manufacturer, who has not less than 5 years successful experience with the installation of similar elevators.

Regulatory Requirements:

Elevator Code: Except for more stringent requirements as indicated or imposed by governing regulations (which must be complied with), comply with

applicable requirements of ANSI/ASME A17.1, Safety Code for Elevators, and Escalators (hereinafter referred to as the "Code").

NFPA Code: Comply with applicable NFPA codes, and specifically with sections relating to electrical work and elevators.

Fire Resistance of Entrances: Comply with NFPA No. 80, and provide units bearing UL labels with 30-min. temperature rise on labels.

NEII Standards for Handicapped: Except as otherwise indicated, comply with NEII "Suggested Minimum Passenger Elevator Requirements for the Handicapped", and the requirements of the State of Massachusetts Architectural Barriers Board including clearances, handrails, locations for signal equipment and similar provisions.

SUBMITTALS

Product Data: Submit manufacturer's detailed technical product data and installation instructions for each principal component or product, and include certified test reports on required testing. List and describe features of control system, performances, and operating characteristics.

Shop Drawings: Submit plans, elevations and details of car enclosure and hoistway entrances. Prepare elevatoring diagrams to show service to each level. Show excavation requirements for jack.

Samples: Submit samples of exposed finishes of car enclosure, hoistway entrances, and signal equipment. Provide 6" to 8" square samples of sheet materials and 10" to 12" lengths of running trim members.

Maintenance Manuals: Submit bound manual for the elevator, with operating and maintenance instructions, parts listing, recommended parts inventory listing, purchase source listing, for major and critical components, emergency instructions, and similar information.

Certificates and Permits: Provide Owner with copies of all inspection/acceptance certificates and operating permits as required by governing authorities to allow normal, unrestricted use of elevator.

INITIAL MAINTENANCE AND WARRANTY

Maintenance Service: Provide full maintenance service by skilled, competent employees of the elevator Installer for period of 12 months following date of substantial completion. Include monthly preventive maintenance, performed during normal working hours. Include repair/replacement of worn or defective parts or components and lubrication, cleaning and adjusting as required for proper elevator operation in conformance with specified requirements. Include 24 hr/day, 7 days/week emergency

callback service. Exclude only repair/replacement due to misuse, abuse, accidents or neglect caused by persons other than Installer's personnel.

Warranty: Provide special project warranty, signed by Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of elevator work during warranty period. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.

The warranty period is 12 months starting on date of substantial completion of elevator work.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Manufacturer: Subject to compliance with requirements, provide products of one of the following:

F. S. Payne Co.

MATERIALS AND COMPONENTS

General Requirement: Provide manufacturer's standard pre-engineered elevator system which will comply with or fulfill the requirements of elevator schedule sheets at end of this section; or, at manufacturer's option, provide custom manufactured elevator system which will fulfill requirements. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator system, and as required for a complete system.

Hydraulic Machines and Elevator Equipment:

General: Except as otherwise indicated, provide manufacturer's standard single-acting under-the-car hydraulic plunger-cylinder unit for the elevator, with electric pump-tank-control system equipment in machine room as shown.

Piping: Provide size, type and weight piping recommended by manufacturer, and provide isolation couplings to prevent sound/vibration transmissions from power unit.

Inserts: Furnish required concrete inserts and similar anchorage devices for the installation of guide rails, machinery and other components of elevator work; where installation of devices is indicated as work of another specification section.

Car Frame and Platform: Manufacturer's standard welded steel units..

Control Systems:

General: Except as otherwise indicated, provide manufacturer's standard control system for the elevator or group of elevators, as required to provide automatic or group automatic operation of the type indicated, and defined in the Code as "Operations".

Single Elevator Control: Except as otherwise indicated, provide solid-state "Selective Collective Automatic Operation", as defined in ANSI A17.1.

Signal Equipment:

General: Except as otherwise indicated, provide manufacturer's standard signal equipment for the elevator. Provide car control station and car position indicator in car, hall push-button station on each landing, and other units as indicated. Provide illuminated buttons and signals, which light-up when activated and remain lighted until call or other function has been fulfilled; fabricate of acrylic or other permanent translucent plastic. Except for buttons and illuminated signal elements, fabricate signal equipment with exposed surfaces of stainless steel with manufacturer's standard directional polish or satin finish.

Car Control Stations: Provide flush-mounted metal faceplates, containing call button for each landing served, and containing other buttons, switches and controls required for specified car operation and control. Mount at height complying with NEII "Suggested Minimum Passenger Elevator Requirements for the Handicapped". Mount in return panel adjacent to car door. Provide operating device symbols as required by Code. Mark other buttons and switches with manufacturer's standard identification for required use or function.

Car Position Indicator: For passenger elevator car, provide either illuminated-signal type or digital-display type, located near top of car. Include direction-of-next travel signal if not provided in car control station.

In addition to visual indicator, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

Hall Push-Button Station: Provide type with flat face plate for surface mounting on wall finish (body of unit recessed). Provide 2-button station where passengers can travel either direction; 1-button station where only one direction of travel is available and indicate which direction that is.

Hall Lanterns: Provide units with illuminated "up" and "down" signal arrows, but provide single arrow where only one direction is possible. Provide units projecting from face plate for ease of angular viewing, except provide flush units where a location in hoistway entrance frame is indicated. Match materials, finishes and mounting method with hall push-button stations.

At manufacturer's option, hall lantern signals may be placed either above or beside each hoistway entrance or in both jambs of entrance frame for the elevator. Mount at minimum of 6"-0" above finished floor.

In conjunction with each hall lantern device, provide an audible signal to indicate that a car is arriving in response to a hall call and to indicate direction of car travel. Signal shall sound once for up direction of travel and twice for down direction.

At manufacturer's option, audible signal may be placed on the car.

Hall Position Indicator: Provide illuminated-signal type or digital-display type signal, located above the hoistway entrance at ground floor. Match materials, finishes and mounting method with hall push-button stations.

At manufacturer's option, ground floor hall lantern signals may be integrated with hall position indicators.

Telephone: Provide rough-in for telephone hand set in the car, contained in flush-mounted cabinet and complete with identification and instructions for use.

Alarm System: Provide emergency alarm bell properly located within building and audible outside hoistways, equipped to sound automatically in response to emergency stops and in response to "Alarm" button at each car control station.

Passenger Elevator Car Enclosure:

General: Except as otherwise indicated, provide manufacturer's standard pre-engineered car enclosure, to be selected by the Architect. Include ventilation, lighting, ceiling finish, wall finish, access doors, doors, power door operators, sill (threshold), trim, accessories, and floor finish unless indicated as not work of this section. Provide horizontal sliding doors of manufacturer's standard flush panel type, with operation and number of panels as indicated. Provide manufacturer's standard protective edge trim system for door and wall panels, except as otherwise indicated.

Materials and Fabrication: Provide selections as indicated for the car enclosure surface; manufacturer's standards, but not less than the following:

Enameled Steel Panels: Flush hollow-metal construction, fabricated from ASTM A 366 cold-rolled steel, commercial quality, Class 1, matte finish, stretcher leveled. Provide with factory-applied baked-on enamel finish; colors as selected by Architect.

Stainless Steel: AISI type 302/304; with manufacturer's standard directional polish or satin finish.

Aluminum Sills: Cast or extruded aluminum, with grooved surface, 1/4" thickness; mill finish.

Plastic Laminate: High-pressure type complying with NEMA LD3, 0.05" thickness; color, texture and pattern as selected by Architect from standard products available in the industry.

Fabricate car with recesses and cutouts for signal equipment.

Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent or open egg-crate plastic, of acrylic or other permanent rigid plastic complying with flammability requirements.

Vinyl Composition Tile Floor Covering: FS SS-T-312, Type IV, Composition 1 of 2, 12" x 12" x 1/8"; color/pattern selected by Architect from available choices in tile industry.

Handrails: Provide manufacturer's standard stainless steel handrails, on side walls and back wall unless otherwise indicated; either continuous or panelized.

Door Edge Protective Device: Provide retractable edge shoe on leading edges of elevator entrance doors which, upon contacting an obstruction in entrance, causes doors to stop and reopen.

Photo-Eye Detection Device: Provide electronic photo-eye device with timed cut-out, projecting dual light beams across car entrance, at 5" and 29" heights, which, when interrupted, will cause closing doors to stop and reopen. Provide keyed switch in car operating panel for disconnecting photo-eye device.

Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time period, through activation of detection device or door edge protective device, a loud buzzer shall sound and doors shall begin to close at reduced rate of speed. Doors shall continue to close unless door edge protective device is activated by contact with an obstruction, which shall cause doors to reopen. Process shall repeat continuously until obstruction is removed from entrance.

Passenger Hoistway Entrances:

General: Except as otherwise indicated, provide manufacturer's standard, pre-engineered, hollow metal type, sliding, door-and-frame hoistway entrances; complete with track systems, hardware, safeties, sills and accessories. Match car enclosure doors for size, number of door panels and door panel movement. Provide frame-section size and profile to coordinate with hoistway wall construction as indicated.

Where gypsum-board type wall construction is indicated, fabricate frames with reinforced head sections; provide sufficient strength without support from wall lintels.

Materials and Fabrication: Provide selections indicated; manufacturer's standards, but not less than the following:

Enameled Frames: Formed steel; with manufacturer's standard baked synthetic enamel finish, colors as selected by Architect.

Enameled Steel Panels: Flush hollow-metal construction, fabricated from ASTM A 366 cold-rolled steel, commercial quality, Class 1, matte finish, stretcher leveled. Provide with factory-applied baked-on enamel finish; colors as selected by Architect.

Aluminum Sills: Cast or extruded aluminum, with grooved surface, 1/4" thickness; mill finish.

PART 3 - EXECUTION

INSPECTION

Prior to commencing elevator installation, inspect hoistway, hoistway openings, pits and machine rooms, as constructed, verify all critical dimensions, and examine supporting structure and all other conditions under which elevator work is to be installed. Notify Contractor in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

INSTALLATION OF ELEVATOR SYSTEM

General: Comply with manufacturer's instructions and recommendations for work required during installation.

Excavation for Jack: Drill excavation in the elevator pit to accommodate installation of plunger-cylinder unit; comply with applicable requirements of Division-2 "Excavation" sections.

Install casings with waterproof seals at pit floor, and with waterproof, high-pressure seal at bottom of casings.

Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place.

Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

Coordination: Coordinate elevator work with work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines and levels designated by Contractor, to ensure dimensional coordination of the work.

Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure, and thereby eliminate sources of structure-borne noise from elevator system.

Install piping without routing underground, where possible; where not possible, cover underground piping with permanent protective wrapping before backfilling.

Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.

Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails, for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

Leveling Tolerance: 1/2", up or down, regardless of load and direction of travel.

Grout sills with non-staining, non-shrink grout. Set units accurately aligned with and slightly above finished floor at landings.

FIELD QUALITY CONTROL

Acceptance Testing: Upon nominal completion of the elevator installation, and before permitting use of elevator (either temporary or permanent), perform acceptance tests as required and recommended by Code, and by governing regulations or agencies.

Operating Tests: Load the elevator to its rated capacity and operate continuously for 30 minutes over its full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of pump motor during 30-minute test period. Record failures of elevator to perform as required.

Advise Contractor, Owner, Architect and inspection department of governing agencies, in advance of dates and times tests are to be performed on the elevator.

PROTECTION

At time of substantial completion of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs or such other methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

Provide similar protective measures for the elevator unit placed in temporary service, including inspection and maintenance service during period of temporary service.

INSTRUCTION AND MAINTENANCE

Instruct Owner's personnel in proper use, operations and daily maintenance of the elevator. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.

Make a final check of the elevator operation, with Owner's personnel present and just prior to date of substantial completion. Determine that control systems and operating devices are functioning properly.

Continuing Maintenance: Installer shall provide a continuing maintenance proposal to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date construction contract maintenance requirements are concluded. State services, obligations, conditions and terms for agreement period, and for renewal options.

Continuing Maintenance: Upon request from Owner, Installer shall execute a maintenance agreement with Owner, in form and with terms, conditions and obligations set forth in "Draft of Elevator Maintenance Agreement" at end of this section, starting on date construction contract maintenance requirements are concluded.

ELEVATOR DATA SCHEDULE

Capacity: 2500 pounds.

Speed: 125 feet per minute.

Length of Travel: 65 feet

Motor Starter: Wye Delta

Number of Landings: Six (6).

Number of Openings: Six (6).

Operation: Selective Collective.

Platform Size: 7'-0" x 5'-0".

640 Tremont Street
Boston, Massachusetts

Car: Flush wall plastic laminate enclosure.

Car Doors: Single speed plastic laminate faced.

Hoistway Doors: Six (6) single speed 3'-6" x 7'-0".

Door Operation: G.A.L. MOD

Guide Shoes: Nylon.

Guide Rails: 15 pound.

Singals: Car position indicator, Fire service phase I & II, In-use lights, Hall pushbutton stations, Top & Bottom hoistway access switches, Main floor position indicator, Hall direction lanterns.

END OF SECTION 14240

SECTION 09650 - RESILIENT FLOORING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Extent of resilient flooring and accessories is shown on drawings and in schedules.

QUALITY ASSURANCE

Manufacturer: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.

Fire Test Performance: Provide resilient flooring which complies with the following fire test performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.

Critical Radiant Flux (CRF): Not less than the following rating as per ASTM E 648.

0.45 watts per sq. cm.

Flame Spread: Not more than 75 per ASTM E 84.

Smoke Developed: Not more than 450 per ASTM E 84.

Smoke Density: Not more than 450 per ASTM E 662.

SUBMITTALS

Product Data: Submit manufacturer's technical data for each type of resilient flooring and accessory.

Samples for Initial Selection Purposes: Submit manufacturer's standard color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.

Samples for Verification Purposes: Submit the following samples of each type, color, and pattern of resilient flooring required, showing full-range of color and pattern variations.

Full size tile samples.

6" x 9" samples of sheet flooring.

2-1/2" long samples of resilient flooring accessories.

Certification for Fire Test Performance: Submit certification from independent testing laboratory acceptable to authorities having jurisdiction that resilient flooring complies with fire test performance requirements.

Maintenance Instructions: Submit 2 copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

PROJECT CONDITIONS

Maintain minimum temperature of 65°F (18°C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 55°F (13°C) in areas where work is completed.

Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Manufacturers of Vinyl Composition Tile:

Amtico Flooring Div., American Biltrite Inc.
Armstrong World Industries, Inc.
Azrock Floor Products Div., Azrock Industries, Inc.
Kentile Floors, Inc.
Tarkett Inc.

Manufacturers of Filled Vinyl Sheet with Fibrous Backing:

Armstrong World Industries, Inc.

Manufacturers of Vinyl Wall Base:

Armstrong World Industries, Inc.
Azrock Floor Products Div., Azrock Industries, Inc.
Flexco Div., Textile Rubber Co.
Johnson Rubber Co., Inc.
Kentile Floors, Inc.
Mercer Plastics Co., Inc.
Vinyl Plastics, Inc.

RESILIENT FLOORING COLORS AND PATTERNS

Provide color and patterns as indicated, or if not otherwise indicated, as selected by Architect from manufacturer's standards.

TILE FLOORING

Vinyl Composition Tile: FS SS-T-312, Type IV; 12" x 12" unless otherwise indicated, and as follows:

Composition 1 - asbestos-free.

Gage: 1/8".

VINYL SHEET FLOORING

Filled Vinyl sheet products are those with a vinyl plastic wearlayer with descriptive requirements of FS L-F-475 for wearing surface.

Filled Vinyl Sheet with Backing: Provide vinyl sheet with filled vinyl plastic wearlayer and fibrous backing complying with FS L-F-475, Type II, Grade A requirements, with manufacturer's recommended static load limit of 100 psi, and 72" minimum sheet width.

Federal Standard: Comply with FS L-F-475, Type II, Grade A requirements except for overall thickness, backing and dimensional stability requirements.

Static Load Limit: 125 psi minimum as recommended by manufacturer.

Thickness: 0.080" nominal.

Sheet Width: 6'-0" minimum.

ACCESSORIES

Vinyl Wall Base: Provide vinyl base complying with FS SS-W-40, Type II, with matching end stops and preformed or molded corner units, and as follows:

Height: 4".

Thickness: 1/8" gage.

Style: Standard top-set cove.

Finish: Matte.

Resilient Edge Strips: 1/8" thick, homogeneous vinyl or rubber composition, tapered or bullnose edge, color to match flooring, or as selected by Architect from standard colors available; not less than 1" wide.

Metal Edge Strips : Of width shown and of required thickness to protect exposed edge of resilient flooring. Provide units of maximum available length, to minimize number of joints.

Material: Extruded aluminum with mill finish, unless otherwise shown.

Type: Butt type metal edge strips for concealed anchorage.

Adhesives (Cements): Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

Leveling and Patching Compound: Latex types as recommended by flooring manufacturer.

PART 3 - EXECUTION

INSPECTION

Require Installer to inspect subfloor surfaces to determine that they are satisfactory. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, ridges, coatings preventing adhesive bond, and other defects impairing performance or appearance.

Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well as to ascertain presence of curing compounds.

Do not allow resilient flooring work to proceed until subfloor surfaces are satisfactory.

PREPARATION

Prepare subfloor surfaces as follows:

Use leveling and patching compounds as recommended by resilient flooring manufacturer for filling small cracks, holes and depressions in subfloors.

Remove coatings from subfloor surfaces that would prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives, paint, oils, waxes and sealers.

Broom clean or vacuum surfaces to be covered, and inspect subfloor.

Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

INSTALLATION, GENERAL

Install resilient flooring using method indicated in strict compliance with manufacturer's printed instructions. Extend flooring into toe spaces, door reveals, and into closets and similar openings.

Scribe, cut, and fit resilient flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.

Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

Install resilient flooring on covers for telephone and electrical ducts, and other such items as occur within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers. Tightly cement edges to perimeter of floor around covers and to covers.

Tightly cement resilient flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll resilient flooring at perimeter of each covered area to assure adhesion.

INSTALLATION OF TILE FLOORS

Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.

Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable.

Lay tile with grain running in one direction.

Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.

INSTALLATION OF SHEET FLOORING

Lay sheet flooring to provide as few seams as possible with economical use of materials. Match edges for color shading and pattern at seams in compliance with manufacturer's recommendations.

Adhere sheet flooring to substrates using method approved by flooring manufacturer for type of sheet flooring and substrate condition indicated.

Use conventional full spread adhesive method unless otherwise indicated.

Use conventional perimeter bonding adhesive procedures where recommended by flooring manufacturer.

Prepare seams in vinyl sheet flooring in accordance with manufacturer's instructions for most inconspicuous appearance, sealing continuously with fluid-applied sealant or adhesive as standard with manufacturer.

Provide integral flash cove base where shown on drawings, including cove support strip and metal top edge strip. Construct coved base in accordance with manufacturer's instructions.

On masonry surfaces or other similar irregular vertical substrates, fill voids between metal top edge strip cove cap and vertical surface with manufacturer's recommended adhesive filler material.

INSTALLATION OF ACCESSORIES

Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

Apply overlap metal edge strips where shown on drawings, and after flooring installation. Secure units to substrate with countersunk stainless steel anchors, complying with edge strip manufacturer's recommendations.

Apply butt type metal edge strips where shown on drawings, and before installation of resilient flooring. Secure units to substrate with countersunk stainless steel anchors, complying with manufacturer's recommendations.

Apply resilient accessories to stairs as indicated and in strict accordance with manufacturer's installation instructions.

CLEANING AND PROTECTION

Perform following operations immediately upon completion of resilient flooring:

Sweep or vacuum floor thoroughly.

Do not wash floor until time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well-sealed in adhesive.

Damp-mop floor being careful to remove black marks and excessive soil.

Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.

Protect flooring against damage during construction period to comply with resilient flooring manufacturer's directions.

Apply protective floor polish to resilient flooring surfaces free from soil, excess adhesive or surface blemishes. Use commercially available metal cross-linked acrylic product acceptable to resilient flooring manufacturer.

Protect resilient flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.

Cover resilient flooring with undyed, untreated building paper until inspection for substantial completion.

EXTRA STOCK

Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.

Tile Flooring: Furnish not less than one box for each 50 boxes or fraction thereof, for each type, color, pattern and size installed.

Sheet Flooring: Furnish not less than 5 linear yards for each type, color and pattern installed.

END OF SECTION 09650

SECTION 09680 - CARPETING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Extent, location and details of each type of carpeting are indicated on drawings, carpet data sheets and in schedules.

Work of this section includes furnishing and installation of carpeting, carpet cushion, adhesives and accessories.

DEFINITIONS

Commercial Carpet: Carpet intended for use in commercial and public spaces, with construction, fire ratings, static control and appearance appropriate for this use.

SUBMITTALS

Product Data: Submit manufacturer's product literature and installation instructions for each type of carpeting material and installation accessory required. Include methods of installation for each type of substrate.

Submit written data on physical characteristics, durability, resistance to fading and flame resistance characteristics.

Shop Drawings: Submit shop drawings showing carpet layout and seaming diagrams, clearly indicating carpet direction, and types of edge strips. Indicate columns, doorways, enclosing walls/partitions, built-in cabinets, and locations where cutouts are required in carpet. Show installation details at any special conditions.

Samples for Initial Selection Purposes: Submit manufacturer's standard size samples and color yarns showing full range of colors, textures and patterns available for each type of carpet required.

Samples for Verification Purposes: Submit the following:

18" square samples of each type of carpet material required.
12" long samples of each type exposed edge stripping and accessory items.
6" square samples of each type of carpet cushion.

Prepare samples from same material to be used for the work.

QUALITY ASSURANCE

Installer Qualifications: Firm specializing in carpet installation with not less than 2 years of experience in installation of carpeting similar to that required for this project.

Single Source Responsibility: Provide material produced by a single manufacturer for each carpet type.

TESTING

Test Reports: Submit certified test reports evidencing compliance with requirements for the following:

Fire performance characteristics.

Fire Performance Characteristics: Provide carpeting that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

Flammability: As follows:

Rating: Passing Methenamine Pill Test.

Test Method: ASTM D 2859.

Surface Burning Characteristics: As follows:

Flame Spread: Not more than 200.
Smoke Developed: Not more than 100.

Test Method: ASTM E 84.

Critical Radiant Flux: As follows:

Rating: Not less than 0.22 watts per sq. centimeter.

Test Method: ASTM E 648.

Physical Properties: Provide carpeting that is identical to that tested for the following physical properties, according to the test method indicated.

Fade Resistance: As follows:

Rating: Maximum grey scale factor of 40 hours.

Test Method: AATCC 16E.

Static Resistance:

Rating: 1.5 KV when tested at 20% R.H/70 deg F.

Test Method: AATCC 134.

Certification: Submit manufacturer's certificate stating that materials furnished comply with specified requirements. Include supporting certified laboratory testing data indicating that material meets specified test requirements.

DELIVERY, STORAGE, AND HANDLING

Deliver materials to project site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, quality or grade, fire hazard classification, and lot number. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat, blocked off ground to prevent sagging and warping. Maintain temperature in storage area above 40 degrees Fahrenheit.

Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

SEQUENCING AND SCHEDULING

Sequence carpet installation with other work to minimize possibility of damage and soiling during remainder of construction period.

MAINTENANCE

Maintenance Instructions: Submit manufacturer's printed instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated traffic and use conditions. Include precautions against materials and methods which may be detrimental to finishes and performance.

PART 2 - PRODUCTS

MATERIALS

General: Detailed carpet construction for each carpet type required specified in carpet data sheet at end of this section.

Carpet Fiber:

Continuous Multifilament Polypropylene.

Carpet Construction:

Fabricate carpet by the construction method indicated on data sheets, using manufacturer's standard process, as recognized in industry.

Tufted carpet.

Carpet Style:

Level loop.

Gauges and Stitches:

Stitches or Rows: Provide stitches or rows as indicated.

Gauge or Pitch: Provide stitches or rows as indicated.

Yarn Description:

Spun Carpet Yarn: Provide yarn size/twist/plies which result in carpet appearance to match Architect's sample(s) as designated for control/selection of color, pattern, and texture.

Finished Carpet Face Yarn: Provide finished face yarn in size, twist, plies to match Architect's sample(s) designated for control/selection of color, pattern, and texture.

Pile Height: Provide thickness indicated on data sheet.

Pile Face Weight: Provide weights indicated on data sheet.

FHA Density: Provide densities indicated on data sheet.

Carpet Color, Pattern, and Texture:

Provide materials in colors and patterns (if applicable) as selected by Architect from manufacturer's standard colors and patterns.

Dyeing Method: Provide dyed material, as recommended by mill to comply with requirements, including appearance and best possible appearance retention.

Solution dyed.

Carpet Backing:

Primary Backing: Provide woven construction or sheet goods, of natural or synthetic fibers or non-woven sheets, as applicable to carpet construction indicated, and as appropriate for service and exposures indicated.

Secondary Backing: Provide 6.0 oz. per sq. yd. woven jute carpet backing, or provide 3.5 oz. per sq. yd. woven synthetic fiber carpet backing. Laminate to primary backing with latex or similar adhesive recommended by manufacturer; provide a bond strength of 2 lbs. per in.

Back Coating: Liquid latex or polyurethane coating or manufacturer's similar equivalent coating as required for carpet stability and tuft bind. Unless otherwise indicated, provide tuft bind of not less than 13 lbs. for looped pile.

Tufted Carpet: Provide coating weight of not less than 20 oz. per sq. yd.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include:

Armstrong World Industries, Inc.
Bigelow-Sanford, Inc.
Cabin Craft Carpets
Collins and Aikman
Couristan Inc.
Gulistan Carpet/J.P. Stevens Co.
J. & J. Industries
Karastan Rug Mills
Lees Carpet/Division Burlington Industries
Millikin and Co.
Mohawk Carpet
Stratton Industries
Wellco Business Carpet

CARPET CUSHION

Materials:

General: Provide cushion which passes ASTM D 2859 (DOC FF-1-70) for flammability, treated with mildew resistance and, if applicable, permanent moth proofing; sterilized, bonded to finished top surface appropriate for type of cushion.

Polyester Fiber Cushion: Permanently inflated, closed cell polyester compressed mat.

Density: Provide minimum density as indicated.

2.2 lbs. per cubic foot

Ounces per square yard: Provide minimum weight as indicated.

40 oz. per sq. yd.

Thickness: Provide thickness as indicated.

.250

Adhesives: Provide manufacturer's recommended adhesives, produced expressly for use with selected carpet cushion on substrate as shown on drawings. Provide materials which are mildew resistant.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include:

E.R. Carpenter Company
Dayco Carpet Cushion Co.
General Felt Industries, Inc.
Ludlow Carpet Cushion
UFI, Inc.
Ogite Corp.
Uniroyal, Inc.

ACCESSORIES

Tackless Carpet Stripping: Provide water-resistant plywood strips, 3/8" or 9/32" thick, as required to match cushion/carpet thickness; angular pins protruding from top, designed to grip and hold stretched carpet at backing. Provide narrow stripping with 2 rows of pins where stretched width of carpet is 20' or less; stripping with 3 rows of pins where carpet width exceeds 20'.

Carpet Edge Guard, Metallic: Provide extruded aluminum fold-down edge guard with concealed gripper teeth; minimum 1-1/2" wide punched anchorage flange; minimum 5/8" wide fold flange. Provide in hammered texture with anodized finish of color selected by Architect from standard colors available.

Seaming Carpet: Hot-melt seaming adhesive or similar product recommended by carpet manufacturer, for taping seams and butting cut edges at backing to form secure seams and preventing pile loss at seams.

Miscellaneous Materials: As recommended by manufacturers of carpet, cushions, and other carpeting products; selected by Installer to meet project circumstances and requirements.

PART 3 - EXECUTION

EXAMINATION

Examine substrates for moisture content and other conditions under which carpeting is to be installed. Notify contractor in writing of major conditions detrimental to proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

PREPARATION

Repair minor holes, cracks, depressions, and rough areas using material recommended by carpet or adhesive manufacturer.

Clear away debris and scrape up cementitious deposits from surfaces to receive carpeting; vacuum clean immediately before installation. Check concrete surfaces to ensure no dusting through installed carpet; apply sealer where required to prevent dusting.

INSTALLATION

Comply with manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet location and lay of pile. Follow seaming diagram as submitted and approved. At doors, center seams under doors; do not place seams in traffic direction at doorway.

Extend carpet under open-bottomed obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.

Provide cut-outs where required, and bind cut edges properly where not concealed by protective edge guards or overlapping flanges.

Install carpet edge guard where edge of carpet is exposed; anchor guards to substrate.

Expansion Joints: Do not bridge building expansion joints with continuous carpeting; provide for movement.

Stretch-in Tackless Installation:

Install tackless carpet stripping with adhesive or by nailing, or both where required for adequate strength. Locate properly for concealment of carpet edge between stripping and base of wall. Strip entire perimeter of each carpeted space, and where possible at obstructions and cutouts.

Install cushion of type indicated in each space to be carpeted. Run seams at 90 degree angle with carpet seams. Place cushion face up as recommended by cushion manufacturer. Apply 2" fabric-type adhesive tape on cushion seams.

Adhere cushion to substrate if recommended by manufacturer appropriate for installation.

In ramped floor areas, increase anchorage/adhesive bond carpet cushion to substrate.

Install carpet by trimming edges, butting cuts with seaming cement, taping or sewing or taping-and-sewing seams to provide sufficient strength for stretching and continued stresses during life of carpet. Apply seaming cement over stitching on backing, if not covered by tape.

Stretch carpet both directions to provide smooth, ripple-free, taut, trim edges; secure to stripping and conceal behind edge of stripping. Use power stretcher where required.

Miscellaneous Installations:

Stairway carpeting: Install by method recognized to be durable and safe for traffic. Conceal edges and avoid placing seams in areas of high wear. Match adjoining carpet installation in every way possible.

CLEANING

Remove and dispose of debris and unusable scraps. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors.

PROTECTION

Provide protective methods and materials needed to ensure that carpeting will be without deterioration or damage at time of substantial completion.

CARPET DATA

Carpet Designation: All carpet

Pile Fiber: Continuous Multifilament Polypropylene

Carpet construction: Tufted

Style: Level Loop

Gauge And Stitches: 1/10 in. x 10.33

Thickness, Pile Height: 5/32 in.

Pile Face Weight: 20 oz. per yd.

FHA Density: 3000

Color/Texture/Pattern: As selected by the Architect.

Dye Method: Solution dyed.

Face Resistance: 40 hours

Static Resistance: 1.5 kv @ 70°F and 20% RH.

Primary Backing: 100% polypropylene.

Second Backing: ActionBac

END OF SECTION 09680

SECTION 09900 - PAINTING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

SUMMARY

This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

Prefinished items not to be painted include the following factory-finished components:

Cabinets, and countertops.
Finished mechanical and electrical equipment.
Light fixtures.
Switchgear.
Distribution cabinets.

Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

Foundation spaces.
Furred areas.
Utility tunnels.
Pipe spaces.
Duct shafts.
Elevator shafts.

Finished metal surfaces not to be painted include:

Anodized aluminum.
Stainless steel.
Chromium plate.
Copper.
Bronze.
Brass.

Operating parts not to be painted include moving parts of operating equipment such as the following:

Valve and damper operators.
Linkages.
Sensing devices.
Motor and fan shafts.

Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

Related Sections: The following sections contain requirements that relate to this section:

Division 5 Section "Structural Steel" for shop priming structural steel.

Division 5 Section "Metal Fabrications" for shop priming ferrous metal.

Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.

Division 9 Section "Exterior Wood Stains" for exterior wood stains.

DEFINITIONS

"Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

SUBMITTALS

Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.

List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.

Samples for initial color selection in the form of manufacturer's color charts.

After color selection, the Architect will furnish color chips for surfaces to be coated.

Samples for verification purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

Provide a list of material and application for each coat of each sample. Label each sample as to location and application.

Submit samples on the following substrates for the Architect's review of color and texture only:

Painted Wood: Provide two 12- by 12-inch samples of each color and material on hardboard.

Stained or Natural Wood: Provide two 4- by 8-inch samples of natural and stained wood finish on actual wood surfaces.

QUALITY ASSURANCE

Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

Notify the Architect of problems anticipated using the materials specified.

Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.

Federal Specifications establish a minimum quality level for paint materials, except where other product identification is used. Provide written certification from the manufacturer that materials provided meet or exceed these criteria.

Products that comply with qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for

use when acceptable to the Architect. Furnish material data and manufacturer's certificate of performance to Architect for proposed substitutions.

DELIVERY, STORAGE, AND HANDLING

Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

Product name or title of material.
Product description (generic classification or binder type).
Federal Specification number, if applicable.
Manufacturer's stock number and date of manufacture.
Contents by volume, for pigment and vehicle constituents.
Thinning instructions.
Application instructions.
Color name and number.

Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

JOB CONDITIONS

Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.

Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:

Devoe and Raynolds Co. (Devoe).
The Glidden Company (Glidden).
Benjamin Moore and Co. (Moore).
PPG Industries, Pittsburgh Paints (Pittsburgh).
Pratt and Lambert (P & L).
The Sherwin-Williams Company (S-W).

PRIMERS

Latex-Based Interior White Primer: Latex-based primer coating used on interior gypsum drywall under a flat latex paint or an alkyd semigloss enamel. Meet FS TT-P-650):

Devoe:	50601 Wonder-Tones Latex Primer and Sealer.
Glidden:	5019 PVA Primer.
Moore:	Moore's Latex Quick-Dry Prime Seal #201.
Pittsburgh:	6-2 Quick-Dry Latex Primer Sealer.
P & L:	Latex Wall Primer Z30001.
S-W:	Pro-Mar 200 Latex Wall Primer B28W200.

Exterior Primer Coating: Exterior alkyd wood primer for priming wood under alkyd gloss enamels, flat lusterless finish, and wood trim under medium shade or deep color high-gloss alkyds. Meet FS TT-P-25:

Devoe:	1102 All-Weather Alkyd House Paint Primer.
Glidden:	1951 Spred Gel-Flo Base Coat.
Moore:	Moorwhite Primer #100.
Pittsburgh:	1-70 or 1-870 Sun-Proof Exterior Wood Primer.
P & L:	Permalize Exterior Primer.
S-W:	A-100 Exterior Alkyd Wood Primer Y24W20.

Exterior Primer Coating: Exterior alkyd wood primer for priming sealed plywood under an acrylic emulsion finish. Meet FS-TT-P-25:

Devoe:	1102 All-Weather Alkyd House Paint Primer.
Glidden:	3651 Spred House Paint Prime Coat.
Moore:	Moorwhite Primer #100.
Pittsburgh:	1-70 or 1-870 Sun-Proof Exterior Wood Primer.
P & L:	Permalize Exterior Primer.
S-W:	A-100 Exterior Alkyd Wood Primer Y24W20.

Synthetic, Rust-Inhibiting Primer: Quick-drying, rust-inhibiting primer for priming ferrous metal on the exterior under full-gloss and flat alkyd enamel and on the interior under flat latex paint or odorless alkyd semigloss or alkyd gloss enamels. Meet FS-TT-P-664:

Devoe:	14920 Bar-Ox Quick Dry Metal Primer, Red.
Glidden:	5210 Glid-Guard Universal Fast-Dry Metal Primer.
Moore:	Ironclad Retardo Rust-Inhibitive Paint #163.
Pittsburgh:	6-208 Red Inhibitive Metal Primer.
P & L:	Effecto Rust-Inhibiting Primer.
S-W:	Kem Kromik Metal Primer B50N2/B50W1.

Alkyd-Type Zinc Chromate Primer: Primers used for priming aluminum under high-gloss alkyd enamel finishes. Meet FS-TT-P-645:

Devoe:	41839 Bar-Ox Zinc Chromate Primer.
Glidden:	5229 Glid-Guard All-Purpose Metal Primer.
Pittsburgh:	6-204 Zinc Chromate Primer.
P & L:	Effecto Primer Red or White.
S-W:	Zinc Chromate Primer B50Y1.

Galvanized Metal Primer: Primer used to prime interior and exterior zinc-coated (galvanized) metal surfaces. Meet FS-TT-P-641:

Devoe:	13201 Mirrolac Galvanized Metal Primer.
Glidden:	5229 Glid-Guard All-Purpose Metal Primer.
Moore:	Ironclad Galvanized Metal Latex Primer #155.
Pittsburgh:	6-215/216 Speedhide Galvanized Steel Primer.
S-W:	Galvite B50W3.

UNDERCOAT MATERIALS

Interior Enamel Undercoat: Ready-mixed enamel for use as an undercoat over wood and hardboard under an odorless alkyd semigloss enamel or full gloss alkyd enamel. Meet FS-TT-E-543:

Devoe:	8801 Velour Alkyd Enamel Undercoat.
Glidden:	310 Glidden Wood Undercoater.
Moore:	Moore's Alkyd Enamel Underbody #217.
Pittsburgh:	6-6 Speedhide Quick-Dry Enamel Undercoater.
P & L:	Interior Trim Primer.
S-W:	Pro-Mar 200 Alkyd Enamel Undercoater B49W200.

EXTERIOR FINISH PAINT MATERIAL

Exterior Acrylic Emulsion: Quick-drying, flat, acrylic paint for use on the exterior over prime-coated wood and sealed and prime-coated painted plywood. Meet FS-TT-P-19:

Devoe:	15XX Wonder-Shield Exterior Acrylic Latex Flat House Paint.
Glidden:	3600 Spred House Paint.
Moore:	Moorgard Latex House Paint #103.
Pittsburgh:	72 Line Sun-Proof Acrylic Latex House Paint.
P & L:	Vapex Latex Flat House Paint.
S-W:	A100 Acrylic Latex Flat Exterior Finish A-6 Series.

Alkyd Gloss Enamel: Weather-resistant, air-drying, high gloss enamel for use on the exterior over prime-coated wood. Meet FS-TT-E-489:

Devoe:	70XX Mirrolac Interior/Exterior Alkyd Gloss Enamel.
Glidden:	4500 Glid-Guard Industrial Enamel.
Moore:	Impervo High-Gloss Enamel #133.
Pittsburgh:	54 Line Quick-Dry Enamel.
P & L:	Effecto Enamel.
S-W:	Industrial Enamel B-54 Series.

Exterior Semi-transparent Alkyd Stain: Semi-transparent alkyd-based exterior wood stains. Meet FS-TT-S-708:

Devoe:	Wonder Woodtones Exterior Alkyd Stain.
P & L:	Tonetic Wood Stain.
S-W:	Exterior Semi-Transparent Stain A-14 Series.

Alkyd Gloss Enamel: Weather-resistant high-gloss enamel for use over primed ferrous metal surfaces. Meet FS-TT-E-489:

Devoe:	70XX Mirrolac Interior/Exterior Alkyd Gloss Enamel.
Glidden:	4500 Glid-Guard Industrial Enamel.
Moore:	Impervo High-Gloss Enamel #133.
Pittsburgh:	54 Line Quick-Dry Enamel.
P & L:	Effecto Enamel.
S-W:	Industrial Enamel B-54 Series.

Alkyd Gloss Enamel: Weather-resistant high-gloss enamel for use over primed, zinc-coated (galvanized) metal surfaces and aluminum. Meet FS-TT-E-489:

Devoe:	70XX Mirrolac Interior/Exterior Alkyd Gloss Enamel.

Glidden:	4500-Line Glid-Guard Industrial Enamel.
Moore:	Impervo High-Gloss Enamel #133.
Pittsburgh:	54 Line Quick-Dry Enamel.
P & L:	Effecto Enamel.
S-W:	Metalastic II Enamel B-53 Series.

INTERIOR FINISH PAINT MATERIAL

Interior Modified Epoxy Coating:

Devoe:	Tru-Glaze-3.
S-W:	Kem A & A Epoxy Ester.

Latex-Based Interior Eggshell Enamel:

Devoe:	Wonder-Tones Interior Latex Eggshell Enamel (34XX)
S-W:	ProMar 200 Latex Eg-Shel Enamel.

Latex-Based Interior Satin Enamel: Meet FS-TT-P-1511.

Devoe:	Wonder-Speed Interior Latex Satin Enamel.
P & L:	Pro-Hide Plus Latex Satin Enamel.

Interior Semigloss Odorless Alkyd Enamel: Low-odor, semigloss, alkyd enamel for use over a primer and undercoat on concrete, masonry (including concrete masonry block), plaster, wood, and hardboard and both ferrous and zinc-coated (galvanized) metal surfaces and over a primer on gypsum drywall. Meet FS-TT-E-509:

Devoe:	26XX Velour Alkyd Semigloss Enamel.
Glidden:	4200 Spred Ultra Semigloss Enamel.
Moore:	Moore's Satin Impervo Enamel #235.
Pittsburgh:	27 Line Wallhide Semigloss Enamel.
P & L:	Cellu-Tone Alkyd Satin Enamel.
S-W:	Classic 99 Semigloss Enamel A40 Series.

Exterior alkyd gloss enamel for use over a primer and undercoat on interior plaster surfaces, wood, and hardboard and ferrous and zinc-coated metal surfaces. Meet FS-TT-E-506:

Devoe:	70XX Mirrolac Interior/Exterior Alkyd Gloss Enamel.
Glidden:	4500 Glid-Guard Industrial Enamel.
Moore:	Impervo High-Gloss Enamel #133.
Pittsburgh:	54 Line Quick-Dry Enamel.
P & L:	Effecto Enamel.
S-W:	Industrial Enamel B-54 Series.

Textured Ceiling Finish: Flo-Spray as manufactured by Premix-Marbletite Manufacturing Company, Miami, FL.

MISCELLANEOUS WOOD FINISHING MATERIALS

Varnish-Type Surface Sealer: Sealer for open-grain wood for use as a surface sealer over exterior plywood before application of a prime coat. Meet FS-TT-S-176:

Glidden:	Y-3651 Spread House Paint Prime Coat.
Pittsburgh:	77-1 Rez Sealer-Primer.
P & L:	Varmor Penetrating Sealer.
S-W:	Chek Gard Primer B42W10.

Oil-Type Interior Wood Stain: Slow-penetrating oil-type wood stain for general use on interior wood surfaces under varnishes or wax finishes. Meet FS-TT-S-711:

Devoe:	96XX Wonder Woodstain Alkyd Stain.
Glidden:	1600 Woodmaster Oil Stain.
Moore:	241 Moore's Interior Wood Finishes Penetrating Stain.
Pittsburgh:	77-302 Rez Medium Tint Base.
P & L:	S-Series Tonetic Wood Stain.
S-W:	Oil Stain A-48 Series.

Cut Shellac: Quick-drying, rosin-free, clear, general-purpose shellac varnish for use on the interior over stained and natural-finished woodwork for a clear finish. Meet FS-TT-S-300:

Devoe:	4900 Wonder Woodsealer Quick-Dry Sealer.
Glidden:	5035 Ultra-Hide Sanding Sealer.
Moore:	413 Moore's Interior Wood Finishes Quick-Dry Sanding Sealer.
Pittsburgh:	77-30 Quick Drying Sanding Sealer.
S-W:	Pro-Mar Varnish Sanding Sealer B26V3.

Oleo-Resinous Paste Wood Filler:

P & L:	Paste Filler

Paste Wood Filler: Solvent-based, air-drying, paste-type wood filler for use on open-grain wood on interior wood surfaces. Meet FS-TT-F-336:

Devoe:	4800 Wonder Woodstain Interior Paste Wood Filler.
Glidden:	Glidden Paste Wood Filler.
Moore:	Benwood Paste Wood Filler.
S-W:	Sher-Wood Fast-Dry Filler.

Exterior Alkyd Gloss Spar Varnish: Meet FS-TT-V-119 & TT-V-129:

Devoe:	87 Spar Interior-Exterior alkyd Gloss Spar Varnish (5500).
P & L:	Vitralite UVA Spar Varnish.
S-W:	Exterior Varnish.

Oil Rubbing Varnish: Clear, oil-type rubbing varnish for use on interior stained or natural-finished woodwork. Meet FS-TT-V-86:

Devoe:	4600 Wonder Wood Satin Alkyd Satin Varnish.
Glidden:	82 Woodmaster Satin Sheen Urethane Varnish.
Moore:	Benwood Satin Finish Varnish #404.
Pittsburgh:	77-7 Rez Satin Varnish.
P & L:	38 Clear Finish Gloss.
S-W:	Oil Base Varnish, Gloss A66V91.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.

Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

PREPARATION

General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.

Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.

Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

Use abrasive blast-cleaning methods if recommended by the paint manufacturer.

Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

When transparent finish is required, backprime with spar varnish.

Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.

Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

Ferrous Metals: Clean nongalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.

Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove

pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.

Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

Use only thinners approved by the paint manufacturer, and only within recommended limits.

Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

APPLICATION

Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

Paint colors, surface treatments, and finishes are indicated in "schedules."

Provide finish coats that are compatible with primers used.

The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.

Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar

components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.

Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

Finish interior of wall and base cabinets and similar field-finished casework to match exterior.

Finish exterior doors on tops, bottoms, and side edges same as exterior faces.

Sand lightly between each succeeding enamel or varnish coat.

Omit primer on metal surfaces that have been shop-primed and touch up painted.

Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

Textured Ceiling Finish: Spray paint to an even and fine texture. Leave no evidence of application such as laps, irregularity in texture, skid marks, or other surface imperfections.

Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

CLEANING

Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

PROTECTION

Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

EXTERIOR PAINT SCHEDULE

General: Provide the following paint systems for the various substrates indicated.

Wood Trim:

Alkyd Gloss Finish: 2 finish coats over primer with total dry film thickness not less than 3.5 mils.

Primer: Exterior Primer Coating (FS TT-P-25).
First Coat: Alkyd Gloss Enamel (TT-E-489).
Second Coat: Alkyd Gloss Enamel (TT-E-489).

Plywood:

Lusterless (Flat) Acrylic Finish: 2 finish coats over primer and sealer.

Sealer: Varnish-Type Surface Sealer (FS TT-S-176).
Primer: Exterior Primer Coating (TT-P-25).
First Coat: Exterior Acrylic Emulsion (FS TT-P-19).

Second Coat: Exterior Acrylic Emulsion (FS TT-P-19).

Stained/Varnished Wood (Doors & Frames):

Stained-Varnish Rubbed Finish: 3 finish coats over stain plus filler on open-grain wood. Wipe filler before applying first varnish coat.

Stain Coat: Alkyd-Type Exterior Wood Stain (FS TT-S-708).
First Coat: Cut Shellac (FS TT-S-300).
Filler Coat: Oleo-Resinous Paste Wood Filler.
Second Coat: Exterior Alkyd Gloss Spar Varnish (FS TT-V-119 & FS-TT-V-129).
Third Coat: Exterior Alkyd Gloss Spar Varnish (FS TT-V-119 & FS-TT-V-129).

Ferrous Metal: Primer is not required on shop-primed items.

Full-Gloss Alkyd Enamel: 2 finish coats over primer.

Primer: Synthetic Rust-Inhibiting Primer (FS TT-P-664).
First Coat: Alkyd Gloss Enamel (FS TT-E-489).
Second Coat: Alkyd Gloss Enamel (FS TT-E-489).

Zinc-Coated Metal:

High-Gloss Alkyd Enamel: 2 finish coats over primer.

Primer: Galvanized Metal Primer (FS TT-P-641).
First Coat: Alkyd Gloss Enamel (FS TT-E-489).
Second Coat: Alkyd Gloss Enamel (FS TT-E-489).

Aluminum:

High-Gloss Alkyd Enamel: 2 finish coats over primer.

Primer: Alkyd-Type Zinc Chromate Primer (FS TT-P-645).
First Coat: Alkyd Gloss Enamel (FS TT-E-489, Class A).
Second Coat: Alkyd Gloss Enamel (FS TT-E-489, Class A).

INTERIOR PAINT SCHEDULE

General: Provide the following paint systems for the various substrates, as indicated.

Concrete Floors and Walls (as indicated on the drawings):

Epoxy Finish: 2 coats.

Primer: Interior All-Purpose Acrylic Primer-Sealer (FS TT-P-650).
Finish Coat: Interior Modified Epoxy Gloss Coating.

Gypsum Drywall Systems:

Eggshell Emulsion Finish (Living Units): 3 coats.

Primer: Latex-Based Interior White Primer (FS TT-P-650).
Second and Third Coats: Latex-Based Interior Eggshell Enamel.

Satin Emulsion Finish (Public spaces): 2 coats.

Primer: Latex-Based Interior White Primer (FS TT-P-650).
Finish Coat: Latex-Based Interior Satin Enamel.

Epoxy Finish (Trash Rooms): 2 coats.

Primer: Latex-Based Interior White Primer (FS TT-P-650).
Finish Coat: Interior Modified Epoxy Gloss Coating.

Interior Wood Trim:

Semigloss Enamel Finish: 3 coats.

Undercoat: Interior Enamel Undercoat (FS TT-E-543).
First Coat: Interior Semigloss Odorless Alkyd Enamel (FS TT-E-509).
Second Coat: Interior Semigloss Odorless Alkyd Enamel (FS TT-E-509).

Stained Woodwork:

Stained-Varnish Rubbed Finish: 3 finish coats over stain plus filler on open-grain wood. Wipe filler before applying first varnish coat.

Stain Coat: Oil-Type Interior Wood Stain (FS TT-S-711).
First Coat: Cut Shellac (FS TT-S-300).
Filler Coat: Paste Wood Filler (FS TT-F-336).
Second Coat: Oil Rubbing Varnish (FS TT-V-86).
Third Coat: Oil Rubbing Varnish (FS TT-V-86).

Natural-Finish Woodwork:

Rubbed Varnish Finish: 2 Finish coats over shellac plus filler on open-grain wood.

First Coat: Cut Shellac (FS TT-S-300).
Filler Coat: Paste Wood Filler (FS TT-F-336).
Second Coat: Oil Rubbing Varnish (FS TT-V-86).
Third Coat: Oil Rubbing Varnish (FS TT-V-86).

Ferrous Metal:

Semigloss Enamel Finish: 2 coats over primer with total dry film thickness not less than 2.5 mils.

Primer: Synthetic Rust-Inhibiting Primer (FS TT-P-664).
Undercoat: Interior Enamel Undercoat (FS TT-E-543).
Finish Coat: Interior Semigloss Odorless Alkyd Enamel (FS TT-E-509).

Full-Gloss Enamel Finish: 2 coats over primer with total dry film thickness not less than 2.5 mils.

Primer: Synthetic Rust-Inhibiting Primer (FS TT-P-664).
Undercoat: Interior Enamel Undercoat (FS TT-E-543).
Finish Coat: Exterior Alkyd Gloss Enamel (FS TT-E-506).

Zinc-Coated Metal:

Semigloss Finish: 2 coats over primer, with total dry film thickness not less than 2.5 mils.

Primer: Galvanized Metal Primer (FS TT-P-641).
Undercoat: Interior Enamel Undercoat (FS TT-E-543).
Finish Coat: Interior Semigloss Odorless Alkyd Enamel (FS TT-E-509.

Full-Gloss Enamel Finish: 2 coats over primer with total dry film thickness not less than 2.5 mils.

Primer: Galvanized Metal Primer (FS TT-P-641).
Undercoat: Interior Enamel Undercoat (FS TT-E-543).
Finish Coat: Exterior Alkyd Gloss Enamel (FS TT-E-506).

Concrete Plank Ceilings:

Spray-Applied Textured Ceiling Finish.

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